Portofolio career research college engneering carerjoin gov

Tshingombe tshitadi fiston

2023

Dhet ,saqa,qcto ,scope teach learner

DHET , TVET /
college nated exam plan college
-Teach and learning plan 2022./2023
Lecture , dhet an St peace college internal external learner
Portofilio textbook.
Student learner name : tshingombe tshitadi
Lecture learner name
Re mark :
- Part 1 framework and conceptual underpinning of plan.

1. Purpose of the plan:

Planning examination national trade examination term and Semester in college framework ,module circular Assessment evaluation test 1,2exercise book learning faculties diploma national coverage time table allocation studies engineering electrical and engineering college peer assessment, self assessment and group assignment sub completed , in college and institute police engineering institute , qualifications implementation n diplomat saga frame work log activities and councils trade test practical .

- Assignment class work internal assessment and external Assessment college nated technical vocational and technical College, training college, coverage internal assessment. Problem based institutes engineering and institutes police Portfolio evidence.

Coverage engineering police and traffic police engineering, subject.lecuture teach and learner.

2.Aim of plan : vision college and mission college and institutes examination subject

,basic advanced research and filling Engineering electrical mission ,planning school disciplinary area circular assessment police department

Input output policy orientation guideline learner college must design engineer, and analyze discovery job vision duet examination policy, and saga policy must meet. Criteria examination planning circular.

3. Objective of the plant: the exams national national trade department and internal external examiner assignment objectivity learner to qualify and learner the end of examination should be able to correct to implement to label to retain and restitution faculties any criteria to improve to take measurements in different ways of engineering electrical.

4.Conceptual underpinning of plan

Lecture and learner planning course class model design, module, and week completed exercise book. time allocation:

Framework regulatory. Engineering studies business Engineering location

5. Underpinning philosophy for delivery of quality teaches On and learning in TVET college.

Teaching.: Report self sat and Pet assessment St peace college internal external term was 3 month qualify Engineering studies business diplomat internal diplomat was record report certificate years, completed scale internal test class work homework record years assessment completed filing Portfolio evidence topics coverage lecture note and learner self assessment and peer assessment critical objectivity learner delivery, lecture annual report principal and rector at examination external. Statement of results for registration attendance regularity or irregularities learner report process learner theory experimental and practical for n diplomat studies business engineering n 1,2,3,4,5,6 years lecture and professor doctoral work textbook and class work reading and professional orientation vocational examination trade subjects and Engineering electrical subjects , College St peace policy guidelines for Poe s works years memorandum exam.

.-**6 Key delivery areas**: in the plan.

Statement and certificate coverage compare marks years college and institutes and test class work40%, 60% exam statement criteria plan module 3 month Engineering electrical subjects research.

-7 the embededness of the teaching and learning plan in college strategy and operational:, research in college and institutes focused examine evaluation was undercover lecture weekend and learner weekend,

-8 **Implementation and monitoring of the teaching and learning plan topic, trade engineering national work research Assessment completed year's m**ethodology criteria research textbook learner.
-9 reviews and adaptation of the plan in successive, the planning submitted on internal and external sat learner and teacher nated ,seta engineering faculty St peace College completed time table planning, completed
Time table orientation principal: circular Assessment evaluation design engineering electrical faculty engineering time table learner policing and college operational time table period movement time morning to afternoon daily weekly move job circular years design development system, subject engineering electrical and information to. Business Engineering. to national trade , subject reports

Orientation
10.Addendum not completed response :

-**College: St peace college and institutes Affric police.**
-completed by : tshingombe tshitadi
- designation:

-Section /output planned activity//report///corrective measure//// targeted date completed…

Section	output planned activity	//report	///corrective measure	//// targeted date completed…	

--sect: work placement, student and lecturer.

-Plane g output , activities/verification minimum//evidence///responsible office design////activity output completed/////activities output not completed ///////target date for completion

Plane g output	activities	verification minimum	evidence	responsible office design	output completed	activities output not completed

-Program in renewable energy offer/enrollment programmation
- College WP student adhere // update college policy.
- process in place network identify industry, action plan ,strategy plan

2.purpose:

.QCTO: Occupational qualifications skill programmed, development report required qualifications documents final verification meeting.

1. Qcto approved application for which qualifications.
-Curriculum template, CV report 10 days after CV finalization.
-scoping report template compile 10 working days after the meeting...
- St peace college full time class study practic,national certificate n1,2,3 any content mathematics electrotech,logic industrial study career field engineer electricity electronics and electromagnetic Engineering dynamic field engineer responsible for generations transfers and conversion of electric power these after engineering are demanding posit industrial , ,,qualification to equipment yourself basic electric to ,star CCTV business use CCTV,camera, monitor fixe indoor outdoor ,,
- design planning, research advanced field, undergo planning system skill planning system skill planner next, development skills components, science natural mathematics. Chemistry device protection components, ensuring maintence. Are components, discovery skill, idea improve, inspect find fault.
.**1... Trade test QCTO...saqa**
criteria measure the power of learning trademarks of Education testing services;
- prepare for criteria Assessment test: cognitive exam skill test personality assessment job test prep... discovery practical question ,score report,full explanation, review amount ..
Employment for learning and teach lecture test service, test design...college business class work.
-engineering electrical aptitude 30- minute test designed ,criteria skill test ,test criteria exam consist question marks typing 1 minute test measure trade theory electric ,mathematics, Engineering science,, panel control wire .test installation item drawing electrical .
Minute...
- prepare criteria test :
time table anted
- Trade mark holder property: ....St peace college workshop class works...
-Licensed electrician' s Assessment
Apprenticeship. Passing assessment category(y(.LEA) 15 minutes
-liken seed electrician’s theory. (LET)...
-the licensed electrician practice (LEP)
Practical test sleet wiring a meter box and switchboard men system test identify.
- Comment on Licensed. Week basic licensed , week number reading comprehension test , numerical reasoning test spatial science test.
- Trade apprenticeship aptitude test, time test, questions, pass score .100marks,
- Iron works elevator industrial...
- mathematics problem reason give day work produce,spacial ,,
- Mechanical reason problem, tools electric circuit point, point, physic question force,
- company electrical trade qualify question theory apprenticeship, class book electrical theory DC ,AC voltage converter cycle ,motor efficiency symptoms, phase ,Val apparent power current calculation properties operating , electronics operating principle test for Dios , diode rating replacement value ,
- Construction soldering connection, power transform...

- trade o ejective install troubleshooting cabling communication,
-manufacture companies :
Site ,plan ...
- Customer date completed.
- determiner later and install and tear patients care system installing conduit component and verify, operational system ,accord install and ,test security system test selected operating measure .. outcome trade engineering
-test anted Assessment required task ,step ,input equality operational basic advanced plant mathematics diffential derivation fundamental theories low ,,
Operational linearity system equation system linear process force ,limited , different fabric force , ,,linear AC,DC, semi
Code trade.

QCTO:
3.Purpose: of course daily course tender provider service require trade ,skill report ,phase ,1,2,3 trade test readiness close report . weekend attandat.
-tender number ....

1 .module / code // module object/// code criteria.
- inducty saft hand tools /recall application man power / relevant coulor marking correct sabs /// recall the operation diffet type module subject correct .
Conductor,joint conductor ,crimoingsoldering prepare,soldering fault find control panekcontact, ,Correct test instrumr, db fuse AC motor control short circuit ,single phase ,mecanicak fault ,fluorescent installation ,phase squirei motor dolautitransfi , commission transmission, transmission generation,measure,
Electronic compont resistor electrolytic diode ceramic diode transistor thyristor triac ,stable vibratory wave average , correct manufacture,
- chain block shockl max works not exceed , // correct cable gears relate years certificate trade clear time frame , training plan..
- company theoretical mathematics subject certiy,module check all settings

4- purpose :
and scope:
saqa , qualifications implentation , statement submitted, statement of work experience,
I'd transcription meeting 71638, primary status registration saqa Assessment 0912 saqa instuty ,30-39 , assessment policy IE099-IEOO, regulation internal saqa decision advance intermediate phase teach , ... agreement ..
Training reg ,com 182609001 seta
Dhet exam id 210002023812, I'd 2004007064381,, ..
Assessor award degree diplomay number not meet and institut award
202303115021 submission numbers,

, N diplome engineering statement
Of work , saqa I'd 90674, NQF level 6, 360 ,saqa learning 67043, .instruction
. statement .
N1,saqa I'd 67109,n 2 saqa I'd 67375, saqa I'd 67491,
- evaluation asssessment
90674: national n diplomat engineering..

1. Qns .Where appropriate applying lubricant correctly to assembly in accordance with specifications and standard operayprocedure...

Required , where appropriate applying packing material in accordance with specifications standard operating procedures, ,inspection final ,assembly conformance , where appropriate returning final assembly to use , diagnose and repair analogue equipment , obtaining and following relevant circuit diagram Manuel schematic ,maintenance record ,locating diagnostic built fault, obtained code interpretation documents,tuning test functionalite and recording fault and equipment , checking electronics equipment assembly,component connection ,

Removing and replacing repairing components from electronic , recording test understanding on electronics , isolating electronics assembly from power adjusting , calibrating electronics equipment ,returning to service testing to specification , returning to service and test to specification the repairs electronic equipment using language and literacy provide, using langy skill , equipment fault find ,reproducting symptoms and verify g ,maintain see ice digital electronics ,look for evidence relevant circuit diagram Manuel schematics maintenance supplielocati g record build , maintence error code interpretation documents running test function ,checking removing and replacing components,, interpretation technical drawing looking evidence checking the drawing againg ,procedure interpreting information drawing writing documents checking clarifying , understaking numerical operation geometry calculation ,terminal xonecct ,check material connection and regulatority requirement ,adjusting and fixing wiring, marking,rigging labelling connection , undertaking testing connection for conformance ,component test AC 15000 volt ..

Marking component dissembling , settings up appropriate test and calibration equipment, setting the controller mode system , completed report commission the control interpretation information ,,

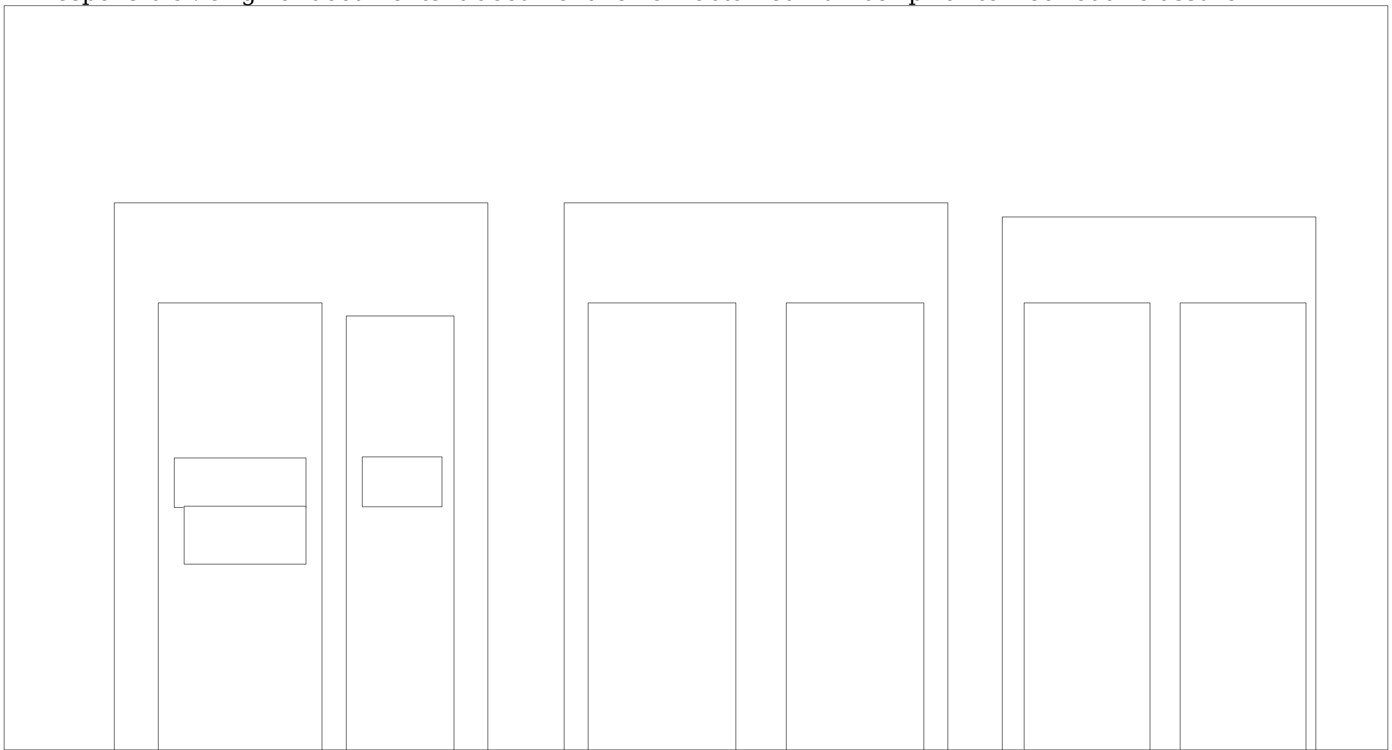
-1.1 ans..How to apply for job research hiring compagnies trade nated to qualified workshop and to council lab workshop school experience time table counsulta,subject reports ready resumes submitted job oersonek..

- basic in Quality inspection check variable appears understand quality experience.

Trade ..

Manufacture inspection , pulling random ,checking product Gain ,verify packing required,shipper packing check point dimension shopper ,check instruction measure chipper gross gives value ,measure cartoon gross weight and compare , shipper material layer sealing card singy, critical defect fail inspection ,,

- maintain repaired electronics planned maintain scheduled , multimeter ,resistor inductor components testing using ,soldering technical basic , circuit board fault finding finding electronics instrument and system mechanic,, .
-width of panel size terminal side switch ,size for component depth ..
- responsible : original documents it document review obtained number prior to Dec routine assure



DHET…

5.Purpose:

Completed time table implentation coverage Summative regularity, subject n1, n6, asservissemnt task assignment homework, marks allocation. 310x 6 , module , content module scaling. 100 marks , student program, asssessment tools marking memorandum ,
Isat.icass continued assessment ,
-Body quality insurance re certificate rating low,
..outcom scotiss qualifications value Assessment Portofilio I Engineering low ,teacher lecture judging evidence ,subject Quality Assurance, the completed solutions, recorded programs assign short ,re-assessment develop Engineering , analyse Probly, designing a straight problem, simulating or constructing ,

candidate class	**part question**	**operationel skill**	**reasoning skill total point achieve**		

- candidate class /,part question ,//operationel skill/// reasoning skill total point achieve,
Mandatory skill development course analyse staring , ,d..
Topics ,nated levej subject module..
- applyy math skill to manupulr low and working skill , cLccul ,
Applied Engineering electric skill analyse .. administration information.
, description of charge, authority ,
Conducting the assessment: high judging evidence internally marked and verified , re - assesment unit assesment ..
-Question / point of process or accuracy //expected responses
- checks length correct conclusion/ evidence correct reason other draw..-
- / evidence of appropriate add sub correct ,
Correct answer..
-eviden e module total examin ER composite ,overall strategy square ..

- totalprocessand accuracy point for test total reasoning....
-isat integrity icass assessment subject .
Conceptual question problem hydro electric generator concept assuming unit, conversion wath current ,
- integrated concept ligth trading concept cost heater , power

Dhet...principle and practice purpose value work component engineering national ncv n engineering,scopet integrity engineering electrical level 4, and n6 saqa n diplomat examinaty.
- Scope of...isat
-Topic mark engineering trade anted and nave.
Produce, operate component driller.
- sub activities task ,time framework time allocation ,
1 manufacture size weight scale power specific, / time.
Total.
- resource requirements
.
Tools assessment, material...
.

- topic operate and

- challenge n diploma duet vs. saga diplomat vs. Vs. anted test council trade reasoning teach learners theory practice learning value assessment.

6.Circulum: value add assessment ,is or is not subject to changed,
Saqa engineering...resoningvs counct vs NC's level electrical infrastructure dhet principal theory practical vs ,NC's matric teach learner assessment execise book technology electric vs, instituts engineering electrical,,, drawing Diplomat math engineering science drawing evaluation trade theory electrical engineering ,step dismental, step dimension works vs in AC machine theori instruction operational requirements algebraic, step qualifications rewinder vs council trade code ,trade minimum ,test resonement low ,test , occupation trade vs quality insurance Engineering , AC ,DC machine ,topic foundation, system ent level AC, vs NC's matric seignoy technical princy AC ,logic circuit math investigation quadratic exsry , input lecture output vs xircuy, trade scht vs code tender instruct,vs Engineering ,code trade minimum, knki manufacture batterycorrect , constructeur installaty circuits grade safety technologie ,nsaaa step work daily acti understaking material package mainty , assembly panel, labelling battery AC , DC, cabling soldering control competu compagy phase ,
- nated base Norton the venin network, resistance parole series start parallel start delta reseat ,advanced field ,dial Deer distributysystem substation vs basic sub station trade VCC,ICC advance physics   chemistry engineering ..
Memorise ,torrseafy advai field but work week basic field electrical under going research ,
- scope diplot vs advance field dhet machine transistay curixuy phase policy mathematic asic field d,
- component job institutor low fundamental AC research AC research ,package low degree ,saqa n6,nqf7,78, degree technoy electrical outcom news , understand experience component didacy AC, DC,psychometric pedagic ,
- evaluation saqa memorise evaluation prep trade test vs. monorise vs memorendum test test circy literay,lecty learning ,Sawa meet reat lecture nated nated ,vs teach learner instity fundamental working compagny,
Engineering : scope work project.
Irregularite semesy policing Poe's award years self meet achieve textbook n submitted, 2000 award policy submitted papper for completed, previous papper discount.
-completed textbook information after achieve DC machine Levi transit advance systeme completed , resposable ,exam holiday memo vs saqa vs is chat to win court , Engineering city power tender to

Portofilio low rules , Portofilio city power experimental job,Shoprite experience but sales documy wallets account treasury ..
- memorise nated instructywas to doing to rwiten ast no study buy opery theory , ciproc ,sars nated council business cooperation work nated lectt copyright and visit studi labour pliay permit to entry schot busit. Lose colrith process casebook ,sars calender busiys hool college in case with dhet deal .memorise markets textbook, memorise sale book sars commission property intellectual de register dhet high educare permit .policy exam national copyrith re mark book bibliogray reference number to mutch years ....
- proficy colrith educare education system note book didacty lesson plan course inventories research methods model lesson plan , business markt businey comments book note order project book, module week was not bring market scaling reproduction project learner

6.1. **Assessment coverage DHET ,saqa council,,**
Subjects :project assessment.. and career mentoring research coverage faculties completed module,
- project title : engineering national trade learner and lecture technical vocational department higher education examination national and qualification Framework national ,council trade and council engineering trade test question papper project modules explanation low rules exercise book, completed outcom project society.

.education construction and project bridge keeping stability journal thesis stability civil engineering,and mechanical engineering and electrical infractute
- psychopedagogie engineering civil outcom technologie ergonomic, ,

1.Project construction and project management,investigate wat key national road conduct study feasibility assess viability upgrading existing route and the construction of new or by pass route , investigation found freight, municipality area . Light

1.project description:

Extension from education n DHET Education to saqa council Education ways distance learning , infrastructure asset, a grade separated .

Strategies construction elimination abnormal educare loop ramp load , bridge .

Bridge Education,bridge substructure piled foundation abutumebt front Poste tensioned voided deck superstructure bulk ,design of layework make optimunmaterisj ,
- problem encounter and innovation,
- piling tender temporaries ,archeological ,

Pile cap, temporary deviations by pass, stop along , empower target,
- Project status: construct, chalkeny, inspection survey, safety educate.

-case study testing implications , to conduct to detail design in order a cuss road mining , accommodation up grade,

Client requirements, pavement,

Layout of trial section x,y lateral restraint ,increase nearing capacity creasing length of shear tension verification geogridr static plate load testing falling weighting deflectimeter were used to verify the effect of geosynthetic ,
- present research: traditional geosynthetic reinforced weakness subgrade and Normally increase ,penotometer testing engineer later works,

Project description: resultat from,pressure depth,project progress, strain material n/ mm , anchor tension force , equivenlent rigidr , flexible baseplate the propose construction programme duration.
- cross section bridge structure, beam seat, concrete panel facing , reinforced,select backfill ,common ,

Extraction of durability subcontract yield stress, ultimate stress MPa ,bridge abutment ..

Framework bmodern labour construction public work program leading to critiques of infractuture sector expand public b,construction maintain,

Council nomination, project layout structure ,, ,
- project description: test site capture data km track Struct deflecty railway train whelk linear teanst steel , position track structure, resultat discussed.

3.dhet mentoring:

Outcom career saqa maq

..education career mine geotechnical agreement Agricole sectorial engineering mining qualification authority mining and minerals sector
. understaking electrical material mining qualification career mine workforce.
Mining sector , why choose career in mining minerals sector, ,
Career mining choose a career how to make a career choice ,
Critical cross Feld skill required mining sector , problem identification and evaluation, problem mathematics literacy , planning career in the mining and mineral sector , wath career suite life choosing qualification, occupational categories technician trade workers ,machines operayorx mainstream career , understand qualifications, artisan career option mining minerals , career,, professional career ,laetber paths career ,financig your studies,,gold platinum metals ,diamond,coaj,cement line, jeweller ,extract petroleum and gases,service incident other .. Bridge catergor

- keep bridge indentification number carer opportunities occupation framework occupation level n qf , occupation categories ,1,2,3 elementaire worker, machine operator,technicia trade , manager profrssy, production

-
-

7.1 Purpose dhet : ,, Education input out put
Subject mining examination , safety health labour mining police. Outcom ,mining examinator national trade , explosion mine , discrimination mine .
Trade AC ,DC, mine machinery.

.7.2. **purpose nated career : bridge static stability briage movement phase periode frequency stable way phase to phase job Engineering** lecture transition phase
- psychomotor job analt functionalite rate class hrv constructy woru saw building task tools must up date collective ,function real word student function machine student rule input output the class function rules teacher created spread , gradient a vector function gradient if scalar f (x,y (arrange partyah, stability construction isostaique diagram force structure hyperstaics beam ,regulation commissair,tools form stable trade nated engineering subject , assessment task build ,mark allocation ,content average , asservissemnt tools ,point balance framework structure stability..
- instability systeme development bridge statement periodic 3 month way key learner break time table semmester maintained up grade up date .
. Teaching plan daily underplani g phase foubda phase intermediate seignor, staff lecture ,junior seignor principal lecturer Engineering traine circulum vocational subject .
Time table general signal linearized x (t). Control didactic process machine key learner input out put loop variable subject x = ,y = y (s(x) discretion signal temp , instant ,energy power time continue R+ 1 , jx ,power ,,
- transformer Fourier control didactic time table x t , r+ 2 dt , counter measure frequency content sum , property x(Q) + ,,property lineaire time table input output , real time table ,,derivation note time table dx = St , TF (St) ,, integra, impulsion diract time table uniform impulsion retenttion xt expent time table ,, complexity time table loop ,
- transformer Fourier TD ✓ (x,y) , ,filtre lineare box lineare circuit transfer input output (s) , x (t) ..
- regime transitaire learner phase and teach system linear u (t) system education stable sponement stat equilibrium means system input out put loop Kirchoff constants transmittance , signal course modulation module week output modules course type trade phase -test readiness
b.test scale maps distance learning corresponding learner concept distance learning graphic scaling size generating km learner distance , scale weigh learner grade real m square space scal factor point ,accuracy mesure survey , degrees latitu ,geodesie projection cartographic board coniaye,, isometric learner plan circulum ,latitude circulum implentation,perimeter circulum schema sequence circulum phase , transformation coordinator geographic circulum policy real engineering, longitudinal meridian ,exposant projection,constant projection p,coirdinat projection examination circuit dhet vs qctovs saqa scale ..

- probably..
-movement phase vibration force oscillator learner, input out
-Low rules of conservation of energy learner circulum policy, engineering move mechanical kinematic energybkEvwork done conservation force ,step determiner system Education , potential conservation input out put teacher , kE1+PEi= kEf+PEf ,step 4 , step phenomen bbeam energy breag,,
Efficient learner ,useful energy or work output ,total energy input, transformer per phase energy phase learner,,
Activity learner device home work scall effici, process kinetic calculate gravi learning linear mecanic,
Frequency constant capacity static displaced,resonance frequency learner materit Curie ,Piezo electric voltage,,
- robot dynamics kinematic control learning teach plant scare , position coordination lineare , circulum velocities Cartesian circulum move phase learn, rotation matrics activities passive rotation ,elementaire phase reprensatat, generality task space classic , body acceleration effectuator ,x y,z, angle ..language machine education funct ,from matric mild learner process ...
- induction learner error resource machine educau..matrix time table line colonel movement weekend months build key ..form work job career .form saqa form dhet ,for qcto language matrices movt 2week ,3 month ,12. ,2 years qualifications experience language matrices deployment years compared , circulum implentation to the college and instituts form moved record exam internal external time typiste record archfile statement certificate,and diploma..fabric system.

8.1 DHET, vs seta merseta sasseta training
Accreditation training,

8.2 Purpose: manufacture relate theory practical, components equipment,
- trade ton max,chain load diameter.
- trade ; code objectivity criteria.
-electrical testing instruments, safety and faulted find ,system multimeter insulator leakage tester phase rotation tester.
1.correct test reading all safety rules ,armored , make standard armoured cable up 16 mm sq core volt glandess ferrules and lugs use to manufacture specifications ,join to mechanical CA2, indentification rating current voltbCA4 terminal PVC cable up to 1209 entry into cable end viz using mechanical compression methode correct according sabs 0142,
- installation of machinery : install and level compressor motor a machine part on a fabricated base ,, All safety aspect adhered to ,no damages to equipment,level withug ,,
Install commercial refrigeration system capacity 19kw refrigerator include pipe work according drawing specific ,single phase induction motor ,phase squirrels cage induction ,rotation correct ,correct ,,trade fault fault fa control find , control panel and motor control all safety aspect adhered sabs , correct test ..
Vs .
1.2. Circulum extra subject electrical energy , industrial electrical ,electronic
Engineering trade theory vs practical
Module energy renewable.
Electrotech.
-thermoelectrical cooling , Peltier low relate manufacture.
Cooling air conditioning modules, technical controller product , coefficient of performance,thermal design, DC current vs technical power supply type,
- recommandation of the manufacturer , comparison of two technical controllers ,,linear vs amps ,,I/max derive dt ,25 k ,0- 0,33 , I/IMAX should middle , 0,33 -0,66 x IMAX ,, coefficient of performance (cop) ,, .. performance vs current, maximum temperature,warm ,cold ,is increased , thermal design,is crucial allowed ,
-thermal design , performance of system, reducing optimise hear sink fan ,power losses isolates area , Peltier elements,,
Dissipation warm side ,Qg=QC+pel.
- I= 30 IMAX ..

-heat pumped vs current:,,I= 0,3 ,, I max ,AC)Qmax , ,,thermoelectric thermocontact cook eratiin DC vs pwrt , maintence ,
- recommand manufactt ,limity current ripple regulatit output ,
- ferrotec , 19 Perce, engineering controller DC curry case manufacture,,power compare..
- Comparasuon of two controller. , Stability to work.
- design process: thermoelectric, estimate heat load interactive test parameter is amount of heat absorption, power dissipation radiation , conversion conductive, dynamic (dQ/St load transfer ,choose Peltier elements ,,

-electrostaric ,electrodynamic, electromagnetic physic industrial electric engineering physics
Heat rejected vs current control play heath thermal hear sink estimate aths ,,
Performance vs current I/ max St heat pump,, heat pump vs current , Amax = Qc /0,25.
Temperature sensor ,object high precision ,power supply requirements.datasheet control information input

9.1. Dhet vs ,seta merseta sasseta,vs saqa,
9.2. Purpose: all the safety and policy
Defense civil and military safety outcom assessment.
Manufacture relate theory practice , engineering learning
- purpose STD 1285,, fuse holders ligthning arrester , electrostatic discy.
Scop commercial and military electronic devices required no stated merseta seta no status to section mandatory , gov gazette etc EIC sabs correct.
- application documents: sabs iec ,,general requirements sabs EIC mil norm ,
-D.3 functionalite marking :mil,sabs ,EIC sabs ,
- terminal identification: acquisition documents identify together functionalite line,load instrument ,
- other marking electrical diagram caution marking caution marking alignment marks, assembly instructions and other marking ,
- electrostatic protector confirm method where size limitations not accommodate all of the marking , requirements order of ,shall apply,
-identifying number sabs sans ,EIC in mil safety code trade CO1, ,, mil
-manufacture source code ,merseta mil ,name trademarks merseta sasseta seta. Mil STD , current rating when applicable ,date code when applicable , other rating and marking ,code method color coding telephone code , merseta colori,,
-Dc breakdown voltage shall be xolor coded ,dot accordance method , except that color circuit breaker,line a,b,c load a,b,c marked ,,main terminal break shall be marked vertical, accomodation letter , precedes , polarity thermo static switch FSC 5939 mil rotary sequence is counter clockwise visibility , acquisition ,open frame construction switch marked construct color pressed moldings , punch identification,
-toggle switches : toggle switch terminal marked in accordance, termination identification, identification push , contact arrangements symbol and terminal marking, single form normal open ,close ,,item specifical space contract number date serial code merseta ,,
- used unit pack bag and ,procuring activities physical space is not available mark mil used,
- designator for part assemblies : designation marking process to IEEE marked ,, sabs sans EIC mil
Reprocurement: contract contract , used assignment.
Details required.
Electron tubes: type designation or number type marking sab, ,labej mounted merseta seta sabs visible ,mil
- electrical electronics part printed wiring board marking mil STD 1285,,
-name plate data ,sabs article mil data confirming applied .. sasseta merseta sabs correct
- mil STD intended use ,issue of discuss,marking for shipping sabs, serial number sabs sabs merseta code mil ,air transportablr item , reprocurement sabs mil , subject term key listing ,name and caution plate, caution plate sabs merseta seta sasseta , mil STD , priority of identification information
Assessment ,marking process,,
-drawing engineering code gage code format size letter mil sabs number system ,
- design activity gage code drawing numb army tank automatics tank wareent number sabs ,size cage code scale ,unit ,

- pin number length contractor manufacture item not change original,defense logistics battle explanation ,record accurate number number duplicate , responsabily Engineering transferring design from design to another ,sabs sasseta seta add cage original identity , maintain design activity activities b, manufacture,pin item meet ,tabulation assembly installation ,source control delineat ,,
- design synthesis : sabs merseta. , Mil

8.2 .Dhet ,vs sasseta seta accreditation, Assessment.
-mil STD , safety security training, merseta required.gov gazette,
Applicable ,: document , general engineering n studies electrical engineering.business studies, Government documents , specifications other government drawing engineering and Engineering science subject safe , order of priceden , definition commercial and government entities gage shelf , contains, design activity engineering electrical , documents ,, functionalite marking engineering electrical joint electronics type designation system engineering electrical subject n ,manufacture identification engineering n diploma , nati supply code for manufacture n engineering electrical trade merseta ,, nomenclature,order of procedt, part identifying number pin engineering, procedure instruction manufacture number ,set select drawing general requirements, government names join electronic type design system nomenclature ,army nomenclature binspection stamp ,special characters contractor entity gage identify marker equipment, except to table ,unique item small item ,limited multiple item , reference design government reprocurement, details required,type number and design,electron tube ,electronic printed wiring board name plate , marking battery circuit, marking labalk ,high voly notice , radioactive matery sabs merseta, ioning radiotion sabs , caution sabs , schematic wiring and cable sabs San IEC diagram , chassis identification, modification work numbers marksabs ,sensive electron device sabs IEC , sensive of marking ,general type number marking process ,wood sabs ,size labals sabs ,material radius corners mounting sabs ,spectral glass sabs IEC , opacity sabs EIC ,permanency durability sabs EIC , note usur did ,marking for , air transportable , .
-2..introduction system management,process , required analyt , functionalite analyy, verification, system engineering process, system and control breaker review trade studies ,modelling and simulation metric risk management.
Planning organising, system planing product and integrating system development,
-3 system engineering. Electrical teade
fundamental introduct , subject , application work experience, definition, facility ground system:
- power distriy system sabs EIC to mil , communication system , bonding shielding and grounding relatship sabs ei. ..mil grounding safety practice sabs , ligthning discharge fault protection noise sabs sans , summary of requirements, resistance required sabs San,resistance to earth sabs sans department defense SANDF communication electronics requirements, typical resistive environment effect,neasyof soil resistivity,one electrode , subsystem ground burier gride sabs,resistance properties ,simple isolated vertical ,fLt potential,, ligthning protection, phenomenon ligthning influence ,strike holder structure less protection flash ,conductor impedance effect,inductor impeteaeth resistance ,basic fault protection fault protect ..
Vs
Saqa engineering electrical learning,advany maintence low voltage fault find , batteries,low voltage inspect service maintence battery charger , designing a lone renewal energy systems, design solar pump trouble shoot PLC,completed certificate competence , demonstrate understanding process communication system,control electrical network a control centre,spray wash energised high voltage network, fault find repaired DC power machine,operate on high voltage network ,select up generator for renewable energy ,fault find repaired electric system winder installaty ,construction
Area 7,
Electrical infrastructure level 3 area ,-
-inspect record report condition medium voltat station appropriate,test maintain high voltage isolator ,earth system, transformer, equipment ,commissy terminate ,,install commission terminate medium voltage joint medium cable dcmachine,mainten voltage switch gear ,,fault find system conveyor install ,mining fault,construction disment,overhead,special area chemical , interpretation State, maintence busbar and chamber association equipment traction substation, 3 kV DC traction regeneration traction inspection record ,breaker ..

--Vs ncv vocational isat frame activity
construction electric . Learner
Practical theory electric principal ,introduct ..

dhet , diplomat engineering electrical,, electrotech, militaire over , defense award challenge Assessment meet defense,,
Electrotech , select power of electrical appliances to achieve set temperature,carry calculation ,convert mechanical energy to electrical energy. , determined the amount energy installation in termine kwh ,, determine cost installation AC ,cost incud , apply vasic magnetic theory, determine magnetic flux density for magnetic, interaction between magnetic field, AC lines of magnetic force ,flux MMF, interactive between current carrying Maxwell,non magnetic relative MMF ,motor left ,theory faults of switching,, determine energy stored,calculate length, principle, ,,compare diffentperiodi. Time form RMS value a stage,value maxitprak additional, explain singlt and three phase system comparison, voltage number calcutlind phase , demonstrate calcul diagram the operationel circuit, explain apply purely ,,explain effect having poorfactoe capacitor, AC penaltiecable size equipmt size current demand,running of induction motor on full load synchronouse static delta star , description transformer determine efficient no load components ,transfotcore ,type AC air breather conservation buchils ,core lamination , emergency stop button warning caution ,,state installation procedt consider all safety precautions application non service generator set , consider all safety ground condition state ventilation noise define refueling access, in AC commission the sets preparation insulation plant proving test suplyis correct installed,all cable are secure and correctly connected,the sets correct out electric ,state earth , connection from non service generator set switch gear equipmt AC check load cable and interconnected,checj the earth operate non service,identify generator,applyloD in accordance with safe working check and adjust generator set running ,mainy voltage ,shut down generator, carry out after use check in accordance completed recomat, maintence non service generator set maintain principal procedure,apply all safety equipment,install non service distribution system,install distribution cables,install distribution units feeder pillar mcv,rcz ,install operate and test ligthning and power distribution system lapds, statement design,ensure correct placement fixumaterial task, ensure task is installed to line,ensure task requirements adherapply electrical standard,ensure compliance with and enforce all regulatoriiij, evaluation thee executive m e electrician task , implementation safe work ,,
Selected appropriate switch gear ,determiner capacity switch gear install diagram,manufacture local distrtpoinr , manufacture data protection,shirt circuit, diversity, maxi demand,connected load ,selected type wire identify system ,determine adequate capacity basic , protect

Dhet ,vs saqa labour mine ,
-Purpose:for plant engineering examination the theoretical section subject,theory practical, Electrical,mechanical,,safety and management ,accident prevention ,fire protection risk control , project management,project financial loss control ,
- electrical technology, DC current machine.motor generator ,efficient DC machine efficient of DC alternating single three phase circuit transfo, production of rotation magnetic, character synchronouse three phase inducttmoyor ,semi conductor ,electric lamp and illumination,electric power transmission,short circuit condition ,circuit breaker ,cable insulator overhead, power economic of power supply,maximum demand ,fault discrimination systemeteical fault ,illumination exploinsion equipment,,
- applied thermodynamics : air and gas compressor and blower,air motor refrigeration and property air condit,psycho entry ,steam generator ancillary ,heater balancing , balancing condensatir steam gas combustion heater transfer fuel transfer , simplestress, strain thin pressure vesell tension pression circular, close coiled shear force vending , temped ,strain second moment bendut shear foundation, fatigue mechanic,property,testing material twisting shaft property, reinforced Crete, conveyor wind plant ,elevator traction ,motion , displacement and acceleration,static dynamic ,belt

and chain ,brake dynamic, toihead gear train lubrufian clutch cranes bearinghydrattransmissiin flow friction losses,material transmission pipe line ,Pelton wheel,flow in kaudnes, hydraulic machine ,mecanic measure air flow,dusting property, Commission safety maintenance condition.
- planing and commission of project maintence schema fire detection system accident investigation, testing and repair electric motor phasing and synchronous AC motor operating tandem fault discrimination electrical,hydrastaic drivers classic sequence general, dust suppression,emission control flameproof,boiler inspection repair inspection vrsei unders pressure, maintence fault diagnosis compression refrigerator and air conditioning ventilation system steam pipes water traps ,steel rope inspection application type,

10.2 DHET, qcto scope, saqa sasseta.
Outcome,
-10.2.1PURPOSE: engineering science, module completed, algebraic linear basic foindamental system process fabric learner engineering science , theory theorem fundamental research,step task
Learner lesson plan lecture plan mapping investigation analyse input out put subject module assessment

f=ma+mg, v=u+at, p=wx.t, Fu= ft, heat = m.a .cxt , equation algebraic linearing exponent , Ax + by=o,,ax.ax b.b y=,,
-fa.a +F.b.b ,   fa.a+FB.b=c.c(x+a) exp .n
Subject Engineering electrical applied
---mathematics ,(1+x) exp n=1,--+ Engineering science g= ma + mg , v=u+at, p=w.t , Fu= f/t, heat = m a.x .c t2-t#,
Engineering draw .. orthographic orthopedagogic educare education,care function.
- industrial electronics, v= r.i , e= v+ r.i..theorem equation loop ,
Trade theory v= r.i, e= v+ r.i , // term 1,2,3,90 days, ///mark score point 100 mark,////inspect policy stolen excy//// recalculate error developm theory inventory motion low formula pedagogie fundamental engineering phenomenon low motion ,

Exchange policy investigation resolve framey regulatority engineering compliance crime vehicle ass license number low, step collationing crime information legal paray, crime source information identifying crime described crime analyse crime ,crime no protect over load identity module subject completed source and need ,design analyse feedback criminals trade theory safety .
-engineering safety engineering completed design creation components safety management prevention low warning protection device incidey hazay acciy ,sab sans regulatory low motion F= ma+mg// Engineering labour ,inspect labour Education levy coid works relation collection misconduct fault award ruling compensation frame accidt ,F>ma+mg,,/// engineering policy framework regulatority implentation legislation informed. Claim assess indentify claim avai procedure case f= ma+mg,, complain f>ma+mg,,
- test trade vs test dhet nated class question theory test ,
Test score mark subject, mathematics , engineering science, industrial elecy, electronical ,total value test engineering y/ evidence low given explanation low low rules limited Lim n (1+1/n) exp n ,, Lim -b +- b+4ac/# a..,,Dy/DX= 4x+3/2x+2.. into..., F=g.ma.mb/br#, p=rl stregy module elast ,fa= FB,/// vc ,vr,r#,r3,r3 Kirchoff northon , //// evidence Poe s resonning comparison test value test improper integral ,test converge diverge limited More ,less Rieman ,we not also define the integral as the limit

as Delta x for to o of the genersj limit goes to infiny how does bound it self ln (2+ x) in this case delta x still equals 5 / n but x I = an integi calculator give resuy,compare force low motion gravity attract,compare test two frequency,compare two load transmission value //// evidence low quotient evidence judgement entry low exhibition limited fract of low rule ,value add ,task requirements logic low value,operator task compare two value force operator mass gravitational limited sum,evidence low lineare limited factorisation,compare two task , , Engineering council.

- visa trade qualificay answer passport, investigation planning system undergo, mathematics, requirements test trade module limited derivation function ,integray function master number rewui factorisation, equation word ,,

-engineering science, engineering physics required test physic: module static kinematics mass force, gravitational heater power motion optique , strength material ,hydray

-,electro required , AC machine components resistor semie conduct insulator ,diode rectifier half electronics ,

E,,trade test require ,basic advance filling ,

Total faculty regularity, and irregularilarity extra classes.

.--1.2

Saqa labal supply Ras nominal 230 v AC sans , wiring is 732 code practice electrical wiring installay is residence ,guide for marking of insulated ,

- electrical machinery regulation learning objectives,sans portable tools , clause council , Framework, equipment ,metal work, sabs 767 earth leakage protect , wound transformer secondary unearth sabs 743 ,high frequency generator ,, switch marked clearly user to maintain in a serviceable conditions , chief inspector performance prescrib testing manufacture of electrical machinery, qualifications experience,earning

10.3. Purpose: dhet nationt trade n engineering electrical,, fundamental engineering level and License trade engineering electrical professional council .. engineering electrical science engineering, mechanical engineering

engineering electrical ,

- compare low test methode two motion Hopkinson , indentify shunt machine or more system learner low evidence low , v = applied voltage output power GI =1.V1 generator ,input power of motor M = (I2) , I1+I2,

An ,n = efficient of machine output power,zm*= n (I2+I2).v= input power of G,out power of G = n x input , n,= √I1/I1+2, armature ,total loss generation, à losses irons for generation , n= (I1+I2)v-Pm/(I1+I2)V..,

E1=V-Ia.Ra,,E1/E2=$.N2/$1, Serie motor two motor load ,,E a ,E b, . mechanical couple, motion angulair velocity transitaire permanent current power lineare two system , grouped generation pilote ,two transformation load or more system , resistance,, enclosed area learner

Learner motion engineering trade

- phasor diagram total system complex wave transmit generator, fundamental results , maximum amplitude equation ration , learner,

- e1= Em.sin 2w.t, ,e2= k2.Em.sin 2.wt,,,e3=k3.Em.sin . 3 wt,, en =kn.Em.sin.wt,,,value wave algebraic sum fundamental and harmonic,,e=e2+e2+e3+….+en

=Em (sinwt+k2.sin2wt+k3.sin3 et...k sin wt ,, diagram connected balanced load 4 wire ,load is vector,z 1=Z2=Z3=Z3= z ,, Ena=Enb=Enc,,ENA= EP<o degree, I 2=ENA/Z2= EP,, ENB=Ep-120,,0I2,I3,,, ,,I 3,ENC/z,,,IN=I1+I2+I3=0,,

ENA=E2,/√3,, z= 15+j..impedance ohm . inductance,

-speed control calculation, E=V-Ia.Ra..N=V+Is.Ra/K.$ armature full load, ,

-electrical engineering advanced basic load system continue learning professional,

: sinus quantity voltage in form ,,U= u.o2.cis(wt) and current I=Io2 cos (wt+j),,

P=U.I= U.o2.cos(wt).Io2.cos(wt+j)

=U.o2.Io2.cos(wt).(wt+j)., U.2.Io cos(wt).(wt)..(wt.j)(wt.j).),,

P, sinusoidal wave,U1=U1.02.cos(wt+j1,,

Layout fresnel , V1=Vo2 .cos.(wt)..v2= vo.cos (wt-2p/3),,v3 = Vo# cos (wt-4p/3),, derivation integration sinus wave phase shift instaneouse average P= p,1/T.iny TD.pd energy effective recovery work heater,power reactive apparent , Q= u.i.sinj,,car,,Q= o.s2-p3,vectorial, inductance, process give voltage node distribution,, I1=j2-j3, I1,I3,I2,,j #,j2,,,I2=j3-j2,,I3=j2+j2,, ok,,balance sinus 3 phase

network ,P= P1+P2+P3,, P= v I1+v2.i2+v3.i3
Power factor active reactive apparent, P=u.i= p+jq

P1.=v.i.(cosj+cos(2wt+j))..
P2=v.(cosj+cos(2wt+j-4p/3)
P3=v.i(cosj+cos(2wt+j-8p/3)
P=<p>=<p@+p2+p+3=<p1>+<p2><P3><,P=3.v.i cos j6.(s) Fresnel,,single phase practical load transfo area , synchronouse motor inte Maxwell Stoke magnetic volume toruf reluctance Kapp hypothesis manufacture motor ,e= NDT/St,, m= cmh
. operationel balance,ms ,loss ,Lenz low,

Low rules assessment is rules,
1/z = ,1/r= impedance resistance alternating ,1/g conductance,1/g,,1/l,1/c ,, sirmence conductor , low Assessment reaction magnetic load learning relation resistance system became impedance or impedance become reactance parallel load resonance systeme load charging, discharge , QC , system stability learning assessment, magnetic demanetismloe, rules engineering compare ,loop,,triangle delta Serie parallel, effect phenomenon
P

, practical work measure: , single phase transformer magnetic excitation field magny , vector denote H created moving electrical charge,Amper H= rot H,=<j Maxwell relation of Stokes integra countiur ,into A.dl= .into.iny rot A.ds,,into c HDL= into.int .d.s magnetic medium, vacuum herin,, B= u.oH,,uo=4.o.10 exp -7, Hm-@,,B=u.o excited,H=B/u°, dimension M and relation, reluctance magnetic, direction flux ..int c.H.dl=into.int.int j.dd=Ni=HL,,denote,€=N.I= into .CDL= into contour , magnetic ,,€=S+N.I = A., N.i=(l-e).B/u,, ferromagnetic to H=o permanent Curie,u+e=r.i , u =Ndj/dt from ,converter equation N@.I2+N3,in primary r@=o,u@=-e=N#.dj/dt, ,i2/I#, perfect tfo=P#=P2.A#,,U#=Z2.I#..complex ,energy balance active ,, power in out speed characteristics,e (I), u= nominal, I: ,,loss= r.i.i+r.ie,p2.j.u,,U=E+R tot , ,
- AC machine engineering creation of rotation fields a magnetic in space at angular rotation w at le blanc theorem a coil of ax by current ,I(t)=i.2.cos (w.t),, i.2.cos (w.t) create a magnetic excitation field ,m .H.H (t), m = complex from I(t).H. , velocity H.H. constant (t) angular velocity cos(w), Ferraris theorem create rotation winding , I1(I).1.2.3,,i2(t),H#,H3,H,3,,2 cos() 1.2 cos () 1t= Uwcos()1+,spaced regularly three could sinusoidal curen w balancing speed, speed synchronouse, bipolar,speed demonstrate Ms=60 rotate 300 rpm ,1
-operator power balance engine, P= r.i,,P= 3.u.i,,
P=3.u.i.cos.j+u.i.u.s.u. ,.p=w.G,,
P=wG+u
I.P.3.U.U.cosj.u, iron loss mecanicak ,3 phase balance,, principle operationel,
-F= into.iny .B.ds Lenz low, variation flux , E=j.f(w-w).e(ws-w).. Laplace force actions magnetic current ,DF=idlr.urB,electromotive force ,,e=DF/St,torque ,P= C.ms,,D's,,do=w.dw,, maximum power , dw.dp.
-low Faraday speed conductor,EMF,E= B.l.v , low la place f.em = B.I.l,, v- ,,pem = fem x = Bxl.l.E/b.l=E.I electromechanic batteries load resisu in magnetic field,,
-leroy design plate number
,sum asyny motor trade type

Type 90.l3,834030 IPP, cos 0,82, AV 220 A,7,5,,,Ks 1,8 Rd 79 yv 380 A, r/ Min 1410 ,is class F ,Amb C degree 40,

mark of motor ,type 90 LS,

LS : letter of the series, 90 = heigh axe ,stand 56, to 100

Number of Serie : 834039,

protection indices : IP 44, 4 protection body solide more 1 m, protection out delivery motor 1,8kw,power factor (0,82) reaction,V = 230 delta ,star current 7,5 efficient 79% level speed rotation vrm , S 2 service in S 1= 100%, S#, 60%, class insulator (A104 degree ,s = 80%, t max exploration 24 kg ,speed torque inerrie monimerric,,,

-charasteristics Puli g, fear reduce treil kR= 60, 0,85,,1450 Min , diameter of axe d=20mm effective treuul calcul pump MD.D/4 ..kg.m.m

Pe=Q.g.h/1000.n..w,w=Fxl,,F=M.g,,wur=M.g.g...w sex Put =wur/t,,loss mec,= c mec.nex,,CA.cc=JD/dt..E=B.l.v,,Fem=b.il,,,,- motor power apparently,,S=E.I.√3,,power active P=,,Q=√s.s-pp,,,...XC=E.E/Q,,c=1/2π.fxc,,Ng=ns-n,,,

-energie use / energy consup ,, efficient machine,w2/w1,,, efficy,= power use/ power consumption,,,,power motor = work/ Tim = force displacement/time,,

-peak - to- peak, 2 peak, maximum=0,5 .peak to peak,average ,0,637,maxm ,1,57,,RMS effective=0,0707, maximum 1,414 , averaged,..

-citcuit RLC loop,source e1(t)..

L.ddl/dt+Rdt/dt+1/c1=dv/dt..

-Engineering electrical : learning

motoring DC command power circuit start connection command start with star deltat ..

, Power fuse f,control transformation,contactor f over load km ,relay k, control button ,time ,motor optional accessories phase, fault relay,ammeter , start delta switch power circuit starting with start Delta switch note out put ,220,75 HP, 125 HP and protection, control transformer,K2,k2.k3, contactor , overload relay,control option accessories,phase operating on dual ,220/380v, 380/660, 440/760 connection y. Star connected reduced ,load restive torque,

Circuit breakers,n = operation time load constant load max, maximum temperature,time,time at rest max , maximum attend load loss cycle duration,time starting access,loss cycle, starting of electric break ,time sequence, Duty..

Development system

- advance power distribution system drawing note,

Provide electrical interlock with S1 breaker km1,class if S1, is open ,S1 control class unit mkm1 is close key interlock a show,provide kmb, f1a key interlock generator breaker GB,provide priority load shed control for feeder breakers in us,f1A switch gears provide interlock,GB to able operationel,when no priority load , provide diagram breakers switch gear with dti trip unit including zone selective interlock and arc flash reduced maintence, provide remote touche screen maitaunancd tip unit communication part ehernel gate variable,end arch flash ,,

- design fault value mms symmetrical,value,I= symetrical RMS current,IP= peak current,e=2,7,w=2pf,f= frequency,time,breaking rated maximum interrupted,150 kv,50!,500 mva rated ,

18kA at 15kv maximum, interruptions of 23kA, 18kax 1.30) at @1.5kv(15kv divided, vacuum interrupted,metal clad ,

IEEE ,

-Check capabilities, 13,8kv x/R=15, 13,8 kV,, primary transfo, 3750, 4,16 secondary,,4,16,, selected breake

System base z=3,75MVA/375MVA=0,01 Pu,,1%,,,

R=z/√x.x/R.R+1=1/√15+1=0,066%,,,X=x/R(R)=15x0,066=99%,,tfo stand 55,% impedance +-7,5,,

Transformer: full load.   31,000,no load,load losses, xR..x/RB,

- phase fault i3 phase = E/x,base current IB=3,75MVA/√3.4.16=0,52,,, system x/R,, I1/x=0,52/0064,, x

- line to ground i.o multiple fact short circuit duty is 8,6KA sym ,phase fault I@ ,,IlG=3(0,52)/0,055=9,9

- fault calculate check breaker application generator busbar system generated is 7,5MVA,4,16Kv,, 1040A full load IB= 1.04kA sub transient, xd' =11, x=0,11, gene x/ R, 1/X's=1/x+1/x+1/x=3/x,,1/RS=1/R+1/R+1/R,,=3/R,,xsb,,I b ASE phased,,3(1,04)/0,11=28,4 symetrical,E/x Amper ,system x/E of 30 short circuit duty ,,

- breaker type 50vcp,/ v max 4,76 kV at 29 kA max ki// 4,16kc per volt,,,,

. purpose.

wiring electrician ,wire way premise,

-network protection line , fuse , commutation,induction, network ,filtre, cable terminate motor ,, Cable motor blonde for conductor heart join ,PVC wire copper ,insulator conductor PVC, colour ,control switch , .

Current assignment conductor p2= uxix h,,p2=uxlxcos,,l= m light conductor,A= section m,,z= conductivity ,coper z,Au increase decrease voltage ,zx increase impedance load conductor section across area conductor ,

, Commutation ,command synoptic system panel design panel order component panel,,

-program action ,switch interrupted,,logic circuit control diagram sequential,, algorithm,logigram control gate grafcett , algorithm initial start end , circuit principle ,power ,

-command electronics ac motor 3phase , rectifier, insulator 410 , ,,2000kw,4000v, 8poles,ECo=1800,loss heater, voltage supply rotor ,E=s.Rco=0,222×1800v=400v voltage out DC rectifier ,Ed= 2,35,,E=1,35×400=540v,current DC circuit intermediate ,I'd loss ..Pr/Es=22800/540=422A,,IRM= IR=0,816Od=0,816×422=344A, form facty angle, amplitude wave, En = 2,35Et.cos π, En=-540v,=1,35×480cos π,,,,π=146,4 degree ,,,line current 480 V rectangular amplitude, 422,RMs,,I=0,816,I'd=0,816×422=344,, --- current transformer water ,RMS,,I2=480v/4160×344A=40A,,.,,

-Motor rotor 3000h ,4160,900r/m,60hz, pump connected voltage 4160v bogie open 1800v,transfo 3 phase connection insulator motor developed 800kw ,speed ,700r/Min ,, s=ns-n/ms=900-700/900=0,222, water ,110,

Design diagram:

Motor AC squirel power nominal of 25hp 1760/Min ,480v ,60hz, 18A cyclo convert ,200v,60hz,gate cycle ,VRM supply,Ea4=14,5HZ/60hzx480v=1160v,, efficient,= 14,5hz/60×1800 r/Min =435 r/Min,, voltage Crete order wave factor ,,max convert voltage , E a =1,35 E cos π, 54,5 degree..

- machine AC DC transformer open lab system game completed module workshop test practical didactic panel experimental

Rotor board 60 mm/, 8 tr,coil 1,5 mm,2 pole ,20 ,total slot shoss,,

test speed , power 100-240VAC, 50/60HZ, means vac / vdc0-65 v, IAC / iDC: 0-20A, speed ,0-400rpm ,40Hz ,0-600 rpm ,60hz ,rheostat rn4x250 ohnm ,80w condensatir 3×80 ,v rheostat ,simulator,,

-molding construction D: 900×700×930 mm, stator - rotor molding,

- expiremental voltage out +15 VCC,1 a protection short circuit 12 VC,24 VC, generator sequence amplitude 5 v Freq

,1 Hz to 1khz , generator variable logic true false , 30 v, tracking,fixe double charged, current Audio signal,

- MOSFETs control motor Serie universal command,

Motor generator: principal 12 v,3000 rpm,1,2A, 3,2 cm charge sustract multiplexer,logic numerical ,4 and (2 input) and ,3 output ,12 and ,input,4 and (4 input) , 12 diode silicone, 8 resistance ,5icc, study ram random access memory flic flop , timer ,stockagr information pan el 4+4 buffer , 3 step scale registrar ,buffer ,8 bits , decoder of 4, to 10 line ,ram ,, 1024× 4 display hexadecimal analogic ,8 bit convertors,a 8 bit ,potent 10v source , bistable demultiplex ,4 flip ,compare ,4 cannot register,

- calcul arithmetic ,16 logic arithmetic, 16 logic ,4 bib ,comptor ,decoder EPROM,8 send led level ,lineare discret amplifier relay ,cablagr structure cabling, test execution system mesure network wi Fi transmission 54 MBS,16 DM ,,

Engineering therapeutic,multimeter ,3 and 4 ,voltage cc,400 MV,4 autorage, oscillator double ,automatic, ,

- energy balance 10 bar ,400 degree, super heat , generator 1500 kWh DW/dt,,o,5 conservation Δu=Q,,

m(u2-u1)+mg(z2-z1)+1/2.m(v2.v2-v1v1) kinetic , into dv ,pva entaphhy ,m(h2-h2)= Q, Δ H+ΔPE+ΔkE=W, w = into P.dv,,w = PAV.. = 1×10 exp 5 n/m (264-1,69).= 95kj/s, force derivation

force conservation Vector F= grad vect .EP , S= sum Q1,
Energy balance thermodynamics, W= m(H2-H1), 1/3 mg(v2-v1/a,,=
T 1=100 degree ,P1= 1 barb,V1 = 1,69m,,,

Mechanical design process..

-calculation copper cm cubic concentrator sodium mol / DM cube ,,2c+ 4,l---Cu2I2+I2,,,I ,
Mineral composition ,mineral , formula,composition ,
LF
..

11. 2. Dhet vs saqa qct ,,

Practical work experience lab workshop,workplace industrial compG y trade Purpose machine manufacturers.

- Namenclature and nameplate information ,DC motor theory, disassembly and inspection,testing, armature, commutator,frames, ventilation and accesoir,motor assembly and final testing,on site troubleshooting,faillure analyse ,carbon,brushes c,current , density and performance, installation,startups d baseline information, operationel monitoring and maintancd motor and baseline installation data ,,how to read motor. Nameplate,motor storage , how to rewinding ,140step disassembly motor wipe off ,remove the motor take motor , tips namel nylon and polythane .magnet wire electric motor insulation papper, utility knife wire cutter ,flate blade screwddiy pliers,lint free cloth aorkglo e,

, Motor rewinding process, remove winding , remove insulation papper clean housing,burn out tenant of insulator, prepare new winding ,insert new insulation papper burn out of insulation,prepare new winding on a spool,insert new insulation,papper house the housing ,solder and insulate winding end , tie solder varnish wind reassembly motor test, analyse 3 phase ,3000,rpm magnetic field ,motor board ,motor inscription board ,motor nominal volty, nominal,of rotation,R +* frame1,5 ,calculation parameter new winding Diameter internal ,external .mm cylinder slot, package dimension of iron core ,measure length stator package IP 87mm,external diameter stator packy Dv =755mm number of stator gaps z=24,step calculation paramet,now measure dimenst of statorslot width of slot,b1=6,621mm,b2=8,5mm,heigy of stator slot,h=13,267mm,opening of stator slot Bo =2mm, height of slot neck a 1==0,641mm,toot width bz=3,984
Qu=π/B(b1.b1+b2.b2)+h/2(b1+b2)
e=Qu=πb.b/4+Hb..
-calculation number of poles= 60.f/ns=60.×50/300=1..speed, (2810),
-calculation poles step , T= π.S/2.p=3,14×75,5/2.1=118,53mm, pole step ,
-calculation poles surface, Qp= t.lp=11753.77=203211mm sa, calculate pole surface, heigh of lamel mm,type isolation ,papper lacaue,
Calculation the tooth length Hz= Hu+a@=B,#67+0,6712=@3,908m,,Hz - tooth length, Hu heigy of stator ,
- calculAtion height yoke stator , hj=1/2!Dv-D-2.hz)=1/2(128-75,5-2,13,908)=12342mm,hg heigh of the yoke,Dy external Disney,
Calculation the cross section of teeth of poles Qz = z.bz.iz/2.p=24.3981.80,04/2.#=38,237 cm Qz one tooth cross section,z number slot,bz width aualition of slot ,
Q4= π/8.(b1.b.#+b2)+h/2(b2+b2)=π/8(6,64) exp #+ (8,5)2+6,33/2(6,62+8,5)=93,4mm,

- calculate number of slots per pole an pole,aaq= z/2.pm= 24/2.1.3=4, number of slot per pole ,z= number of slot,
step in t = z / #.p=24/2.1=12, winding factor ,q 1 to 8, $ 2, $..
, Calculation of induction in teeth of stator ,Bz=Bzr , Qp/Az. Induction bzbzr induction in gao, calcul inductt yoke, bj ..Bzr.Ap/π .Qj =. 0,65.103.13/π.9.88=2,15T, induction stator yoke,bzr induction air gap, step calculation of magnetic flux pair poles ,d= Bzr .Q.p.10- exp 4/1.5 exp 7= o,oo427 e ,, Flux magnetic per pole Webber,
- calcation of the numbers of turn phase W' = 0,22.uf.a./ d.f.e= 0,22.230./o,oo427.50.0,958=347,39, w calcul number turn , if phase voltage v , a number of parallels branch, flux magnetic,step calculation number of turn in site ,Su = 6.w/z = 6,247/27=62,75, 62 ,su calculation numby of turn fillings,
-calculation of cross section of the wire ,
wv=Qu.fu/su=93,4×0,34/62=0,512 mm,
wv cross secty of the wire Au= surface of slot, , dz=2.√wv/π..3.√0,512/3,14=0,807

1.Award degree diplomat:award degree diploma .1th,2th,3th,4th
NQF national qualifications frame work
NQF.,1,2,3,4,5,6,7,8 diplomat framework regulation documents bulletin subject
Documents Portofolio meeting sa saqa I'd standard criteria
Engineering electrical meeting in RDC leaving diploma bulletin, statement leaving .. instituts
Saqa exam award documents police criteria meeting
Documents, engineering n electrique
Purpose documents 24month
Working
Release :

Diploma certificate document submission high degree diploma
Consentence .consent purpose award degree diplomat certificate qualifications transcript subject meeting required
Requirements subject meeting .
2.Subject :no meeting diplomat national
Diploma national: n1,n2,n3,n4,n5,n6
Level 4, subject minum nated exam and trade test panel wiring
Documents Portofilio process nated
Isat process council
Nated exam :

,Statement resultat
Irregularilarity process final award degree diplomat .
School meeting qualifications process continues.
No meeting ..
Meeting school leavers
3. Outcomes national :

Requirements: task theory step input equation operation basic advance operationel mathematics system integration differential derivation fundamental low step system analyse system process fabrics investigate process device,
Δx.
DX/du=x exp (e expx+e/x)exp x

2, operationel equation input out system linear process force limited different fabric force , v.ra.

3 system equation input ration factories process force different Va vab
Task step system fundamental lineaire input force different x .v1=v2×t2/t1..DX/Dy

Subject. N.1,n6,. assessment task,mark allocation 310, content module. ,student week completed submit asssign, tools asssessor 100

Engineering practice 240 ,24 month cabling join fridge armature ,busbar safety db , building

On Thu, 09 Feb 2023, 10:44 TSHINGOMBEKB TSHITADI, <tshingombekb@gmail.com> wrote:
1.National qualification frame work .nqf6
. engineering n electrique and teacher NQF 7, education technology
Subject
1.2 .Purpose :statement resultat:
Assessment :
Credit 120 ,field ,originator sgb,
Framework:
Criterion minum require scop maximum
Tools asssessment:
Entry award degree diploma originator ispt Kinshasa exeta it kitomesa inpp dr Congo math info unikin. No meeting / St peace college n engineering saqa ,
.. pursope engineering nqf evaluation
1.3.Tools assessment. Award diploma n
Assessment entry exhibition

Statement

Policy saqa
2.1.National diploma nated trade
Credit 0,5 certificate
Statement entry n 1award degree diploma saqa framework
Module
Policy department n diplomat engineering n 1,2,3,4,5,6 certificate
Module topic Portofolio
Statement
Implementation exam learner
Module n engineering subject :
Module 1,2,3,4,5,6,7,8, submitted textbook .submitted exam papper exercise assignment assessment

Lecons topics
Scal marks analyse
Lecture output resulta assessment
St peace college: textbook note on line
Completed week

Examinator national papper ,
Statement resultat outcom nated

Panel wiring

3..Careers education department research scientist bono work.
0utcome
Discovery

Evidence low: difference reasoning test motion ,low required equation basic fundamentals operational plant mathematics integration differential derivation fund's .
Low task analysis system equation input output linear process force limited different integration, system fundamental experience.powersysyem electric shop precautions workshops electrical shop absolute, asssessor rubrics,
3.fault find and protected device device control sequence second low I stallation , components installer PVC ,conduct,metal conduit flexible low ,DEP low installation of equipment right tool ox clear safe verification installation,
4, investigation engineering electrical of the low task subject module ,
5, investigation fact in issue relevance admnise,
Investigation the function weighting of evidence function judge control of the jury market subject,,
6: analyse investigation design system requirements information required force engineering electrical subject module task operationel plant mathematics integration differential fundamental, Lineare.
7.

Investigation principle criminal low and substantive due process rules admiss and relevance basic engineering electrical.
8.investigation evidence: collection are recovering crime processing method scene documents organisation processing crime final result sketch.
9.admbistration communication skills assessment stress skill engineering,
Information manage system ,
Framework regulatority legislation mandatory engineering power arrested civil implementation, delivery report anual engineering electrical l,
10.
Training security skill development registered assessor admnise progr engineering safety keeping documents inspection and power inspecteur offence and penalite..
Up electrique the assignment .
Criteria questions,poor behaviour,suffice,advance, excellent
Low integration police security framework
11.verification sasseta.
Durie development low power systems shop tools precautions workshops low rated investigation tpm engineering maintenance fire arm integration in crime scenario police framework regulatority legislation OSHA.. occupation health low find fault and protection device control circuit sequence second low sans installation components fault spark insulator cable low electrotech installation of equipment right tools clear,low motion investigation challenge admnise Fail corporate equation

Criminal low substation die process rules admnitrade low informer situation account process determine profitable methods scenario organisation processing sketches,,..
Low supply safety power regulatority..
13..low council engineering and council trade occupation safety step task creation case study.
Low visa permit work council practice verification EIC CEi power systems electrique linear circuit lab DC power supply function work low stand size.motion low agreement,
14, trade association amendment trade operationel system integration foundamental step.input
Trae basic advance..
X work operationel factor empires product e exp x logarithmic activities x inconu add divided work exponential x inconu factor linear entry exhibition motion equation trade translate,electronic , Operationel engineering,
Test trade council engineering career.
15low examinator skill time table work permit admnitrade time ,time table week time allocation subject , assessment, assignment council trade mark allocation,permit content average 8working 6level 24subject,x work operationel x exp n products e logarithmic actually x work factory lineare derivative integration test low lineare x operatoire AC DC ciy assignment mark weeek ,week DX/Dy working labour allocation work step xEx logic n possibly competency rating evaluation licence Permit permit mark allocayweek.sabs statem.
ln, vab(va-vb)
Motion low service ln logarithmic voltage Va -vb operationel compare suply resistor R2,decide by sum resistor Serie R1+R2 plus voltage total step compare difference ial gradients DX DT linear impedance operationel compare logarithmic expontiak, resistance production z impedance over r step parallel operationel permit trade design gn control switch ways to reduce voltage and decreasevoltagrn,,,trade generation equation load cabling equation lineare transmission linear load lineare

Tshingombe tshitadi fiston
Portofolio evidence low ,
Case study

Cover letter :

Tshingombe Tshitadi
engineering electrical
To
st peace college and city power
23 April, 2023
tshingombefiston@gmail.com
0725298946
yeoville, rsa

Dear Sir/Madam,

administrator training and resource humane

Sincerely, for my requested career outcome in academical 2 years training and examination theory and practical for subject curriculum assessment need t more practice in your company ,Courses engineering electrical Work Experience Title/Position city power training /st peace college training 02/2023 - Present , rsa engineering electrical visited work place training experimental Achievements/Tasks award degree diploma saqa/ award panel wiring electrical that my requested for completed experience in your departement and compagny solicite that job for visited site experimental technology and science engineering experimental thank u for your complement and gratituid
Tshingombe Tshitadi

,

RESUME AND CVS

My Resume

Tshingombe Tshitadi
engineering electrical
engineering electrical implementation time table to job time company experimental trade
tshingombefiston@gmail.com
Phone Number
Education
Study Program
st peace college
10/2020 - Present
,
jhb r
Courses
engineering electrical
Work Experience
Title/Position
city power training /st peace college training
02/2023 - Present
,
rsa
engineering electrical visited work place training experimental
Achievements/Tasks
award degree diploma saqa/ award panel wiring electrical
Contact
:
0725298946
-
tshingombekb@gmail.com
Skills
panel wiring electrical
Personal Projects
engineering electrical visit st peace college/city power
(04/2023 - Present)
award certificate diploma / saqa n engineering
Organizations
st peace college / city power
(04/2023 - Present)
engineering electrical training trade engineering ,
Certificates
engineering electrical/ studies statement
(12/2022 - Present)
engineering subject n,1n,2n,3,n4,n5,n6 / saqa n diplomat studies final assessment and examination /
Languages
Assessment practical topic st peace college portofolio evidence low coverage . icass internal and external assessment : relate low circulum more to practical ,

Project week and allocation time table research : saqa suplementaire subject :

Research and project circular assessment visited city power,

Student St Peace college company education

Career outcome

Portfolio evidence low practice assessment engineer electrical, ca

Student name tshingombe:

Content

1. **Scope: research implementation framework study trade theory practice engineering study time** table assessment allocation implementation framework regulatory in government. City power and Eskom training center development infrastructure support training train training experimental student case study. Time table allocation research integrity subject outcome more. Department education dhet DBE and council trade assessment integrate

1.2.Abstract: knowledge student case study engineering design analysis investigation field: tendered time table trade ask factor in company overview in city power ,research experimental trade theory research training knowledge city power municipality: job Gauteng city approved I in power electrique metering house home basic,
Join venture government development Eskom commission entrepreneurs.
Labor health inspector electrique compliance merest manufacture.
Saps electrique engineering supply.sandf mil development system defense environment STD physical company security close tendered required safety security electrique factor

1.3 purpose: overview in developing company tendered city power supply:
Engineering electrical case study
1.4. Requirements,
Engineering electrical training time table integrity subject outcome theory license trade .license practice trade .anted test ride panel warming and learning level electrique principal license. Development subject written assessment circular time table self assessment peer assessment class work written projection case study anted module week student
1.5. Task.
Ask answers: theory practice visited plant operations experimental assessor in workplace labor.
Questions asked analyze overview on subject working in developing training company, answers responsibility sector appropriate sole Consol working
Attendance was the factory trade theory regularity and irregularity in sector find material design in classes and sector find means industrial company relate manufacture majority and minority in power plant that means to Create a system to support the training. And support to attendance learner in power city more job opportunities.
1.6. Task
Ask questions power to integrate sector training was satisfactory in CVS to gate information for training
Power city metering customer need to trade customer technology outcome technology module trade theory education technology trade theory power education circular customer instruction metering customer service energy sale buyer energies electrique

1***.7. Step.***
Need to cost customer power factor theory company customer supply need tax value trade theory consumer supply appliance electrique metering cost maximum demand trade theory rate :
Technology invoice customer service energy to make system projection engineering trade theory implementation in demand factor in power city trade supply customer power factor to working training. Question answers overview.

Cost home house city appliance electrique rate . Geyser metering training tree phase, single phase metering asking to be implemented time table allocation trade theory
1.8 Operational support rendered
Government labor.
Government industrial.

To compliance Labor: electrique power factor test inspection compliance.
Time table allocation
Relation education labor technology
Test installation Electrique metering single phase .three-phase test trade certificate coca.
Checking inspection safety health
Machinery occupation health test

Design inspection

.

Description	Unit yes or not
Tender: supplies saps development load company manufacture in city power **Saps student** **Time: information management system, performance system development** **Tom engineering** **St peace college Afric instituts police** **Practice work** **Reg : C0700401099** **Sars vat :9237228238** **Sasseta number: accreditation:111999691949** **CHIETA : national certificate in electrical engineering level2,3,4..** **Electrical infrastructure and building skills,electrical and building skills, electricak and control panel wiring,** **Merseta:17-QA/ACC/1311/17.mexhatronics level 3,3,air conditioning refrigerator vantilatiin fitter welding control instrument HVAC, hydraulic,,** **Nated n2,6,, mict ACC/2014/07/3188..** **Computer NQF level, info technology systems,computer** **I'd exam** **Saqa n diplomat;I'd 201911130002** **Learner faculty** **CHIETA.sutudent certificate number:COM182609001.** **ID:2100002023812.** **I'd:2004007064381.** **Admission permit and examination time table.engineering study.50110002..** **External exam: I'd number instituts college** **RegNo:2013/034490/07** **Dhet no:2019/FE07/028** **Dhet exam No:DDP1220/19/00130** **Merseta No:17-QA/ACc/1250/16** **External exam: Afric trading** **Sasseta creeditation 112999691946..** **Registration dhet:2019/FE07/014** **Merseta 17QR/ACC/1312/17.**	-47.2.requirement n diplomat engineering. ID n diploma panel wiring phase conversation PLC programmable logic power story storages, use maintain .graphic diagram design, St peace college outcome career generation power station and saqa award degree diplomat continue supplementary assessment student subject choose trascrip record no meeting engineering electrical diplomat dhet . Log activities company city power implementation visited day field manufacture technologies trade. Training - Interpretation drawing electric code graphic. Purpose. Assessment: explanatory electrical plan create electrical plant, Content, with is purpose benefit of electrical, metering city power and St Peace college workshop - How to draft an electrical. - Tip for making electrical plan, interconnection of different component and fixture to the system .in training cooperation. Visited - power line with details such as size voltage, rating, power transformer and winding, the main switch breaker and fused switch, - draft ,step layout scale drawing room ,cabinet ,step 2,plan it advance your electrical plan, step walk your pal building., tips for making electrical furniture light switches and electrical outlet, - Plan for additional outlets renovation, Amount table Lampe, yea, later, appliance wiring plan, -electrical plan legend Calling mounted light, duplex receptacle, telephone outlet switch. - Basic electrical plans, - Patients room electrical plan create your electric plan firm a patient, Basement wiring plan --when listings out item such a feeder breakers and wire size, for particular project piece of distribution equipment, Intern of electrical distribution, -schedules are often included switch board and panel board, drawing to list number of circuit breaker load feeder ,size and number of wire , Project Schedule usually expressed in tabuled, organised self explanation. -typical ref, legend and

LP R/09/2017/07/0018.
EW seta 2093-280525.
LGRS-2093-200525.
Exam.899992880...

Subject.
Full..
47.1.Requireded: operationel subject field saqa . seta implementation
Saqa award certificate.
Assessment conduct seta
Saqa award diploma certificate n engineering.and
St peace college training skill.mseta CHIETA.. development panel and control wiring
Level engineering electrical.infracture development. Meeting saqa requireded I'd..no meeting statement skill development.id certificate award St peace college .db box outlet socket switch dol motor.transformer.
Control instrument mechatronics,
Career development city power graduat.implentation .career
Continue trade skill supplementary trade meeting month trade . foreman

ID: 258968 saqa commissioning domestic or commercial .
ID: 10259 saqa fault find repair and maintenance tree phase , electrical engineering.
ID : 263006 saqa ,demonstrating wiring of premise defining
ID : 258937 ,install ,maintain low voltage,DB protection
ID116466: inspection and circuit ,
ID: inspection and maintenance control and control panel and circuit ,
ID111388 :saqa electrical engineering and construction
saqa I'd 67461: N3 code instruction category meeting ,A,B,C,..
Level2,3 ID : 258937..plant generation , distribution, construction mining chemical and energy sector, maintenant,DB, protection,electrical safety cleaning,
--scope of work specifications.sans 10142,
- circuit breaker ,isolator, contractor and relay ,install Db , inspection Db ,
ID10607, 10605,10634,
- replace fault
-ID 116434: control electric network from a control electrical . Centre sgb ,power plant .field manufacture engineering and manufacture.
-Switch way panel wiring education technology.
I'd ,electromechanic .electrotechnique ..

- build drawing s:
Construction project is completed is revised drawing, created and submitted, constructor, high, any charge
Initial design drawings.
-Construction process completed.
.
-Electrical drawing and schematic.
-designing installing troubleshooting electrical system requirements use various, line represented.
- design engineering and technician use schematics to build and troubleshooting
-One line diagram: medium voltage switchgear one line diagramed, and power systems single diagram.
Is often drawing flow of electric.
Typical: major components in the power systems list system voltage, transformation impedance, interrupting rating and fault current just the basic .item
-Drawing should be kept.
- Main control room of a
-switching operation by identifying feeders and the load they serve,
- System voltage frequency phase and normal operating position line diagram,
- For more detailed view of an electrical distribution system, three line diagrams is used phase polyphone a c, system drawings, connection.
- Diagramed show distribution component such bus rise, bus plug, panel, board, transformer, small, branch circuit, drawing alarm, system,

-schematic diagram
Purpose: man schematic diagram emphasis circuit elements function relate components, series or parallel
Found, inductor, diode, logic gate, fuses contact, switch, every circuit,

-circuit breaker control schematic:
Wiring diagram. Terminal for selection terminal, relay, load detector relay wiring diagram.
-main purpose of a wiring diagram electrical circuit arrange, schematic diagram,
- wiring diagram ,part , device terminal strip, appropriate number,letter,colore design,terminal and connection between the components are clearly,build repair ,
-Block diagram: reference input filter sum, controller actuator process plant, distribution, sensor,
- arguably ,basic type of electrical drawings block, diagram, components of complex systems,form of block,internnected,block provide a conceptual, idée a process is completed, electrical,
Symbol.
Represent schema

teacher I'd .saqa .	-logic Diagram: current gate and logic gate clock - Breaker failure relay logic diagram. Modern protective relays utilization diagram to represent complex circuit process .electrical. - Schedules. A build Electronics use soldering. And disordering. System...welding iron, solder, silver, or copper lead, desoldering, plug, outlet, cleaning disconnectorb, connector.printer circuit fabric film microship process. Silicon. Plastic molding... Fit recess .fit wiring .process... Control - Instrument method selector design metering process I Appointment of service provider supply St peace College and city power delivery component lab workshop part time table subject... -introduction global stage St Peace college. -Scopes of project: projection required supplies to purchase and deliver total, -Special condition component Subject module metering 4. Purpise documents. Budgets: a projection budgets St Peace college city power time table fee.burasary.close graduation interne ship fund student.gov -Quotation value tax (vat) project: _time frame project is to commence success bidder Firm price subject, name of the company quotation close Appliance and company subject. - Item description of good part number quantity Evaluation criterion (80/20). -request for quotation number -limitation to quote supply and delivery Item/ description of good //quart///price/// bid price RSA 001 /engineering electrical practice workshop projectile engineering open view lab test lab and workshop practical saga .duet training exam paper .seta. Assessment police //// amount estimation fee Total include .8modul x 24subject x3month 200 projection years amen's test experimental technology. Training integrity one project... -delivery period Specifications required for project: Registration saga assessor conduct certificate.

	Saga I'd institutes foreign. No meeting institutes accreditation saga decision. Admit /30-39 NC's. Total credit. -assessment policy IE099-IE00.regular internal, Saga decision 10105/14 advance diploma intermediary phase teacher. Conduct... .n1-n3 national certificate engineering studies. -N1: Saga ID6710, N2 saga ID 637375, N2 saga ID 67491...Entrance... I'd saga award diploma N ... Ncv assessment plan isat . 40.7.1.Subject.. assessment task test assignment internal external assignment .assessment tool. Marking memo rebruc ,,.. topics subject outcom. Topic 1,2,. ,time and marks allocation 1h marks...examination training training formal. ...t raining exam rwiten permit and time table practice exam days. Fundamental subject ..icass .time frame, asservissemnt activities, scope assessment term 3, suggestions allocation .analyse grode.. Isat integrity practice..time frame .allocation require .. 41.1..required city power vacancies Estimated ICT service Research inovation: -table of content . Graduate internship Training center employee.visitor student apprentiship visited education technology high school and trade development school skill training .trade education career outcom exhibition engineering education training. 1.city power vacance 2023.for officer special and variations use career opportunities. Training oppoy . Metering guyser. Light city .training engineering career. 1.1 How to apply for city power vacancies 2023... Student career granted. -meter reading submission: St peace college time table engineering electrical Portfolio evidence low consumer panel wiring customer and plant experience design cost power factor demand reader implementation in city power loop .. Interlock system. Training partnership test. Outcomes career student generation power station transmission trading. - City power workplace ready to light up career artisan engineering. - Name of profile - City power. -manager vacancy. -city power officer vacancy. -city power specialist...

	: 40.10...requirement: implementation --SAQA module award diplomat -Award diploma n.engineering electrical -Award instituts foreign decission saqa -registration .award saqa n1,2,3,4,5,6. -Award meet documents. -Assement assessor saqa conduct moderator I'd: 202001305040/20191130002 Dhet exam nated: 201000203812/2004007064381/2011007434332. . 40.10.1 requireded of work experience logbook instructions programme code 5090840..national n diplomat.engineering studies electrical I'd :90674.engineering studies NQF level6, 360, credit saqa learner I'd 67043 national electrical engineering nqf .level6..learner name :tshingombe Tshitadi ,surname : Tshitadi Fiston. Number employeer : Details compagny St peace college city power: Name signature...
Check up	

To compliance Labor: electrique power factor test inspection compliance.
Time table allocation
Relation education labor technology
Test installation Electrique metering single phase .three-phase test trade certificate coca.
Checking inspection safety health

Machinery occupation health test
Design inspection

Tender: supplies saps development load company manufacture in city power
Saps student
Time: information management system, performance system development
Tom engineering

2.1.4 operational preliminary case study visited power city
Operational required:
Permit working tendered temporaries permit and license study council permit government homes affairs study permit foreign citizens plants permit, and RSA permit I'd and exam
Exam permit period passport visa tourism transport logistics student
Meeting
2.1.4.1. Permit allowed minimum job career student permit security in BTs training allocation minim job
Social work classification job government to allowed case study student trade exam to be experimental in the plant city power Eskom and government institutes labor department
Visa code trade booking exam I'd time table days and time 4subject
Permit legislation framework regulatory mandatory to more experience pass port visa student I'd asylum to to work and studies tourism in the plant
2.1.4.2. Questions factory ask/anew student was not allowed to trade in the plant and to be training in the plant for dangerous .labor insurance compensation and development social student have for more information was poor in the sector theory to gate more information and to overcome power city member employment to work exam practice together in national planning plant was no coming successful for students to allowed. student must drop CV in entrepreneurs and city power to be employ for training and gate information not for work outside but in the plant system no to work in time table allocation technology outcome student to work powerful in academic workshop
Student to research and work power city information metering geyser in the academic research time table academic time table electrical .and student
Can gate qualifications. Security reception more policy power city framework did allowed customer services to delivery more information only training center power city was allowed training.
2.1.4.3. Ask / answers. Factor permit
Pass port time table careers. Factor physical security Eskom close tendered required company security must be completed student security sassed accreditation school. And student seta number request for allowing
Student engineering assessment council engineering and trade council visa I'd permit student for trade exam.
Was Questions more with visa internal city power Eskom
Day visit rendered was not defined to student to working in government city power Eskom, search research system integration student circular assessment to work and find minimum granted for examination labor.
2.1.4.4 .CVS student city power and training trainer to delivery bill information system. Integrate job government student was alone by self explanatory no company tendered work partners with city power Eskom on visiting site student was not in site was dangerous place for health student working in higher voltage and irregularity students in the system . System need to trainer training appropriate job and faculty appropriate school power city in school development plant power city metering student in meeting plant, school collie Eskom commission. Department trade industries Industries Company in trade company examination engineering, engineering labor school in engineering
Electrique in commission class school generate
1.4.6 .student college assessment workshop workplace class work. Homework research engineering project process in field faculty research department research.
Ask/
2.1.4.6.1 Faculty allowed system engineering lab engineering.lab workshop engineering studies and library academic studies center assessment engineering. Permit engineering allowed engineering time table work engineering 4subject statement engineering case studies for projection cost trademarks was outcome technology.
Misconceptions faculty retention subject psychometric vocational career guidelines study engineering projects trade plant engineering analyze design investigation system .generation

electrical magnetism generation transmission system anted CCTV , study material, building student experimental plant city power how plant was working
Tendered close time table n1, 2, 3,4,5,6 NQF /level subject in system continue basic advanced filing engineering fundamental system
. Circular system study must undergoing investigation principle low power.
.consumer power factor trade correction power module student more and company operational required
Gov manufacture relate sassed seta merest accreditation company trade to supply trade test making trading component equipment to sharp fit to step operate chisel mark . Engineering trade in the plants
Design system

2.1.4.6.2..government system national fund financial implications in system exam to more go sector . .go development social worker union fund to student go visited.

Closed sector required minimum score
Inventory

12..4.6.3. Metering module trade theory electrique. Electrotech.electrotechnology resembles instrument measures. Information management system. Framework communication skill, mathematique engineering science outcome engineering electric .factor

Instrument ammpermeter voltmeter wattmeter cos.analogy.digital metering.
Transco metering low voltage .high voltage.
City power Eskom authentic district municipality job customer house building substation. Generation transmission. Transformation cabling sector basic home electric metering power geyser cost
Month consumer kWh indicator meter and coat price inventory
Customer registration number existing installation and customer metering number custom power meter square consumer planning wiring design custom:
Registered customer training sale air time and metering installation single phase and tree phase installation industrial installation. Customer
Municipality lighting road ways street municipality designing civil engineering power lighting switch ways system.

Trade light to implement bulb trading data system.
2.1.4.6.5. Metering implementation time table experimental generation transmission level and panel skill experimental in the system house home development to the plant training city power Eskom.
Practice electrique engineering research academic switch ways design db box outlets socket award qualifications time table investigation switch ways circuit breaker motor investigation analyze design power factor to be re implantation in company city power Eskom commission entrepreneurs go implement to be working in system. Policy system academic sibs sans trade theory licensed
System information analysis engineering fundamental system process...
Communication system engineering electrical license term trade to be implemented in city power was installed

3.1.4 operational preliminary case study visited power city

Operational required:
Permit working tendered temporaries permit and license study council permit government homes affairs study permit foreign citizens plants permit, and RSA permit I'd and exam
Exam permit period passport visa tourism transport logistics student
Meeting

3.1.4.1. Permit allowed minimum job career student permit security in BTs training allocation minim job

Social work classification job government to allowed case study student trade exam to be experimental in the plant city power Eskom and government institutes labor department
Visa code trade booking exam I'd time table days and time 4subject
Permit legislation framework regulatory mandatory to more experience pass port visa student I'd asylum to to work and studies tourism in the plant

3.1.4.2. Questions factory ask/anew student was not allowed to trade in the plant and to be training in the plant for dangerous .labor insurance compensation and development social student have for more information was poor in the sector theory to gate more information and to overcome power city member employment to work exam practice together in national planning plant was no coming successful for students to allowed. student must drop CV in entrepreneurs and city power to be employ for training and gate information not for work outside but in the plant system no to work in time table allocation technology outcome student to work powerful in academic workshop
Student to research and work power city information metering geyser in the academic research time table academic time table electrical .and student
Can gate qualifications. Security reception more policy power city framework did allowed customer services to delivery more information only training center power city was allowed training.

3.1.4.3. Ask / answers. Factor permit

Pass port time table careers. Factor physical security Eskom close tendered required company security must be completed student security sassed accreditation school. And student seta number request for allowing
Student engineering assessment council engineering and trade council visa I'd permit student for trade exam.
Was Questions more with visa internal city power Eskom
Day visit rendered was not defined to student to working in government city power Eskom, search research system integration student circular assessment to work and find minimum granted for examination labor.

3.1.4.4 .CVS student city power and training trainer to delivery bill information system. Integrate job government student was alone by self explanatory no company tendered work partners with city power Eskom on visiting site student was not in site was dangerous place for health student working in higher voltage and irregularity students in the system . System need to trainer training appropriate job and faculty appropriate school power city in school development plant power city metering student in meeting plant, school collie Eskom commission. Department trade industries company in trade company examination engineering, engineering labor school in engineering
Electrique in commission class school generate

3.1.4.6 .student college assessment workshop workplace class work. Homework research engineering project process in field faculty research department research.
Ask/

1**.4.6.1 Faculty allowed system engineering lab engineering.lab workshop engineering studies and library academic** studies center assessment engineering. Permit engineering allowed engineering time table work engineering 4subject statement engineering case studies for projection cost trademarks was outcome technology.
Misconceptions faculty retention subject psychometric vocational career guidelines study engineering projects trade plant engineering analyze design investigation system .generation electrical magnetism generation transmission system anted CCTV , study material, building student experimental plant city power how plant was working
Tendered close time table n1, 2, 3,4,5,6 NQF /level subject in system continue basic advanced filing engineering fundamental system
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Design system
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.go development social worker union fund to student go visited.

Closed sector required minimum score
Inventory

3.1.4.6.3. Metering module trade theory electrique. Electrotech.electrotechnology resembles instrument measures. Information management system. Framework communication skill, mathematique engineering science outcome engineering electric .factor
Instrument ammpermeter voltmeter wattmeter cos.analogy.digital metering.
Transco metering low voltage .high voltage.

City power Eskom authentic district municipality job customer house building substation. Generation transmission. Transformation cabling sector basic home electric metering power geyser cost
Month consumer kWh indicator meter and coat price inventory
Customer registration number existing installation and customer metering number custom power meter square consumer planning wiring design custom:
Registered customer training sale air time and metering installation single phase and tree phase installation industrial installation. Customer
Municipality lighting road ways street municipality designing civil engineering power lighting switch ways system.
Trade light to implement bulb trading data system.
3.1.4.6.5. Metering implementation time table experimental generation transmission level and panel skill experimental in the system house home development to the plant training city power Eskom. Practice electrique engineering research academic switch ways design db box outlets socket award qualifications time table investigation switch ways circuit breaker motor investigation analyze design power factor to be re implantation in company city power Eskom commission entrepreneurs go implement to be working in system. Policy system academic sibs sans trade theory licensed
System information analysis engineering fundamental system process...
Communication system engineering electrical license term trade to be implemented in city power was installed.

Engineering electrical evidence collection guidelines recommend police and army police military... digital electronics item may have.compuyer .mobile devise laptop.record ammunition.place cushioning material comparison analysis prevent damage record manufacture serial number model found fire arm weapon . Examination item information. Personal contact.modeor disconnected from network Faraday bag main tenant power to devices d consultant digital forensics examination package items in butcher. Do not tape item. Exploitation mitigation.xollect USB device.dvd.xd gasman DNA examination.seaech cybercrime offender computer networking chat room phone explosion technology in order hack criminal’s crime targeting computer intellectual property...
Police support to army operationel.principleoperation police rules low operationel environment..
Planning preparatory and assessing police operational planning execution asssessor.base man power mission police station detention cell operation enforcement compliance legal...strategies.policing.
Laboratory support. Low enforcement patrol main power... function justice system...tools mark... enforcement low safety security engineering electrical safety management systems.patrolmainten working build management
Implications...
Tom police security city power and College training system.

Professional engineer electronics or electrical engineering... financial program.information use to generate information on pretermine object indicator. Description and information...visible policing crime investigation.specialised investigation.intelligencr information management protection VIP government security regulatority.static security.physical security system tiditechnical indicator technology...perusal registrar system police investigation director. Manual system. objective statement indicating.infrasture development structure plan respect work report is base saps project..
Project poling facility management to maintain. Control system. community service reporting cycle quarterly and responsibility crime investigation implementation responsibility office .the non proliferation of weapon mass destruction act 1993act no87 of 1993..police interviews scenario.... engineering electrical city power electrique metering scenario vs. appliance electrique metering time table low enforcement appliance fire arm appliance customer CCTV radio security customer security it PC cyber customer appliance TV radio bomb missing circuit network vs. city power trade challenge assessment police engineering electrical time table trade theory engineering low non according manufacture and related,
:
Engineering modules equation algebraic linearity exponential ax by...a square +bbsquare network.... engineering planing components.researxh advanced field generation ,skill explain, development skill components,science natural mathematique,device protection components , discovery ...
Engineering investigation resolve of crime framework regulatory engineering crime incidence...step collating crime information legal , crime source information ,indentity crime describe crime analyse.crime zone no protection over loa.identify plan subject completed source and need design describ analyse feed back trade safety...

Engineering understand code conducteur.reason .learner. Discovery...
Point reasoning. Question. Operationel.skill total achievable processes. Add value learner assessment...apply skill solution resolve problem...
Questionnaire point of process or accuracy. Evidence...expected response evidence appropriate division correct trade Engineering correct multiply,evidence copper is correct each line trade theory ...DC current equivenlent force emt.. Junction rules Kirchhoff rules potential rules RC circuit. Shock hazard, thermal hazard tree wire system...terminal voltage...
Key terms... instrument that's...
deflection...

Descrition	Unit yes not
Key equation terminal of single voltage source v terminal=sum -I re few=R1+R2+R3+RN **Sum = junction rules sum Lin =sum I out, loop rules, terminal voltage of voltage source in parallel v terminal, = r,-I sum courant.** **Time constant t=RC.** **.direct current current during charging of capacitor, I=£Re-try=Ioe-tRC...** **Charge on discharge capacitor q(t)=Qe-t,£** **Electromotive force, EMF work done per charge keep..the voltage output of a device is called v terminal and v terminal=€-Ir...Rs =R1+R2+,,,,,, current resistance find low him** **Resistance resistivity length found area resistance wire , copper across...** **Electric power...** **P=v.t...p=vsquare/r.. battery to power supplies...** **Cost..cost = power rating in kWh x number of our it run x cost per kWh..** **Home monthly cost appliance every day possible includ dryer.micriwave.tv back ..if does give power give the should. A current.any thing in the socket 220v ..socket is cheap on the power is how much.. electricity continued to increase efficiency to offset consumption.. energy saving are account up being cheaper...** **4.2.DC courent direct current vs alternating current ac ..** **Battery products DC current batteries voltage EMF is constant constant current circuit capacitor store charge current from socket...** **If look voltage peak +170v decrease through 0 to -170 and rise value 170 really be 110-120 that actually average but peak really is about 170..0oscillating voltage product electrique field..electron response to this oscillating field and oscillating back and forth producing an oscillator curent in the circular..** **Graph voltage as functions of time current this average value voltage from wall socket it know as the root mean square,or rms, average.voltage varies sinusoidal.positive as negative doing average..vrms=0,707Vo and Irma=0,707I.0.. Instant 0.606...serir parallel voltage supplied Series resistance equivenlent.parallele...** **Performance a mechanical inspection and reporting on motor transformation workshop... components main...connected...AC current...Phase diagram...ohmic resistance only v=r.i...I=sin.w.t in phase R..AC ..l=v.sin.w.t.dt..v.i=sin Wtl,,,current lags ..WL =2πfl=x inductive reactance integrated...**	Value estimaton calculation

Operator j with rotate a vector 90 degree in anticlockwise direction 2j=1,j=1... power triangle..S=P+jQ..s=p+jQ...apparent, a=v.i =>Power ...Q=Isqquare..... **DC generation...VT=Ea-Iara voltage full load...ia equal is ,, speed e=d|/St=|p/60/n=PN/60.2|60...2flux pN/120..f=p.n/60 sinusoidal AC voltage of factor induced EMF Conductor=1.11xe=(1.11)x(2fluxf)=2.22..emf par volt per phase x no of turn 4.44 flux ..Contactor...** **Instrument.** **Magnetic equation deflection's=B.I.l.n deflection torque TD=force x perpendicular distance...a=lxb TD=TC ...** **Parallel movement must same..** **Ish.rsh=I-im ..I=I'm(1+RM/Rsh...** **V=I'm(RM+Rse).. v=VM(1+Rse/RM.....** **e=d/dt(lI)......** **Power wath meter consumption torque balancing energy in the circuit is directed registered..speed increase ..phase error occurred phase difference pressure error temperature.creping TD=TC ..flux =[v.i.cos/(krp)(DM/dflux)=[kdM/dflux].P..k=kRp..p is power consumption..m mutual inductance.teta .instaneouse current in pressure coil resistance v=√2.v.sin.w.t insta voltage ..IP=√2.ip.sin w...average deflection . average deflection...**	
Total	

9.provide contextual information established : in city power and St peace college students engineering electrical research implementation trainings appliances electrical fault guyser stove light outlet socket current power factor demand factor mettering customer trade . theory current power delivery to the customer and customer appliance requirements need to trade theory outcom system engineering electrical.true power real power factor regulation system information.metering control analogy digital system sale kWh .metering customer demand single phase tree phase industrial.domeatic .

Theory current state previously study trade theory to wiring db box mering client domestic appliances technology electrotechnolgy trade.

Certificate license test trade theory validation low real power factor

Reactance inductance impedance system metering challenge instrument controller metering reading cost 1@kwh,value1rand tax value certificate issue matter license code client mettering indicator trade metering . investigation sale .

9.8 compared resultant obtained statement visited investigation metering St peace college time table learning cost grade cost value time .need to verify by the college St peace engineering work study engineering works place workshop trade cost appliance time credit accreditation value and city power real time delivery and sale cost building real time consumer schedule.....

10. Title report should indicate.
11. Weak titles, strong title appliance electrique engineering electrical

Fundamental system .power...

:

4.2.1. Requirement appointment of plants engineering electrical consultant provision professional services city power and St peace College Anted statement engineering electrical theory city municipal provincial infrastructure visit development projects case study topic Portfolio evidence.

4.1.2 Sub sector manufacture main tenant St Peace college engineering learner assessment outcome transmitted generation power station metering electricity electromagnetic career outcome to visit joint venture city power government.

4.1.2.1 Special IST mark application

_ Discipline mark application

_roads and traffic engineering, road and storm water pavement evaluation, road transportation and traffic impact access studies St Peace college .relation circular assessment traffic map design, _parking and access studies traffic management .traffuc police. Enforcement low .study material in assessor assignment engineering, tom,

Maintenance police technical support material advisor circular assessment guidelines study investigated principal.Nd information management system framework regulatory government Gazette act material design investigation city power with happened and methods research city power traffic registrar research engineer low traffic prevention low.

_structure and building cause ways, Culver's bridge community. Stability equivalent equipment policy maintenance design meetings breakdown in the plant system

_electrical: rural electrification substations, network protection and control design. Energy efficiency demand assessment development operational maintenance and tom repaired road traffic engine structure and building criterion plan

-demonstrate

-relevant experience key personnel

- Bidder experimental skill methodology

-total point

-criterion professional liability insurance R3m for each and every insurance methods research qualifications and roles of each staff

2. Implementation framework regulatory legislation mandatory engineering electrical case study circular time table in visited work components innovation CVS city power Implementation close submitted of course daily tenders note assessment peer and self class assessment discussed note provide services trade skill report phase1,2,3,4,5,6 registered trade test reading experimental close Portfolio evidence documents week lee attendance release resultant statement

5.-2.1module: induction safety hand tools Conductor recall carry section join crimping soldering prepared fault find control contactor...

Adhered to correct instrument is used fault find the control panel... distribution fuse AC heavy current motor control open circuit. Short under voltage retain fault single fault application start motor db system .fluorescence installation switch.

Following controller main circuit phase squirrel cage induction motor can. Director line ward automatic start delta autotransformer constant torque phase rotation...generator AC machine transmission... commission capacitor starter phase slips according.

5.2.2. Code: recall application section of the training act 56, 1981, Gazette questionnaire exam conductor method

Crimping joiner electrical mechanical.

No dry joint a damage allocation. Specification insulator testing instruments cables make off core PVC armored MMM core high voltage gland ferrules and used to accord joint rating termination...sibs 0142 identify ply cable 100%,test gears circuit machine protection.

5.2.3 Objectivity: relevant color marking and correct use sibs 0140 hand tools identify checking forming character gas weld working piece trade correct according tender number

Chain block ton max shake ton sign work select voltmeter ammeter energy meter select safety Identify electronics compose wire wound up to metal oxide capacitor ceramics diode transistor thruster %100 correct Solder

2.4 criteria recall the operation of different type of battery identify various type correct maintain according. Manufacture electrical system f connection applicable auto electrical... fault find auto electrical all safety aspects adhered to. Correct according manufacture check and adjust correct procedure settings manufacture camber and...

Correct process adhered. Teat correct stable multivabrator use dual wave form DC AC average value peak frequency rams frequency all reading be programmed p.l.c

..6.1.3. Company requirements

Specifically theoretical pass requirements mathematic and trade theory subject employer college apprentice relevant subject n1,n,2,n,3,n4,n,5,n,6 n diplomat saga award n body quality insurance assessment. Trade test and council engineering.

Applicable value point relate years experience , certificate trade ,5%cleare time frame project, plan training clear roles response, equipment workshop, including.restrsint

6.2. Engineering n diplomat duet career and engineering n diplomat saga qualifications criteria time table n1, n6 trade engineering subject career mentoring outcome subject engineering electrical electricity .college implementation n subject… mathematique,engineering science , engineering drawings.trDe theory electrical,electrotechnolgy,power machine, engineering physics, chemical engineering department.outcom industrial electronic trE test theory.logic control practice learner level infrastructure construction electrique..Outcome engineering electrical career generation, transmission electromGnetic level continue.isat integration practice engineering lab workshop experimental…time frame framework. Practice theory integrate assessment employment saga qualifications Engineering n electrical criteria instituts,sasseta.employment compagny trade gov career graduate internship close city power careers.eskom career training career graduate saqa. engineering n electrique field panel wiring electric . drawing electrique,control logic .cable join .fridge.substation .generation motor .work 24month qualifications.categogie career mining gov and labour examination expiremental, guide ..

.city power network metering and partnership Eskom generated transmission with appliance need. Consolidated for students have time table to visiting reading…security system information access studies or traffic police in building city power, regulation with student accreditation seta sasseta assessment police or circular to working database system entry visited in and outcom student visited day week . Attendance for reason study in trailing BT's city power card passport visa tourism negotiate career graduate student. Visited is individual self assessment student career. And class group school assessment coming for extra visited or large attendance…

Access control ticket for interview career asks or donate individual research things student knowledge individual…

.7.Labour health education for engineering in plant…labour mining examination student examination safety to prevention hazard or any dangerous incidence student labour give permission for engineering to visited plant. Coed if for insurance when is problem to health machinery. In compliance electrique for trade labor national diploma they are covered by inspection labor

7 .14.1Mining qualifications categories maw give permission to visiting categories foreman tradman electricity mining industry. Hazard exploinsion fault discrimination detection exposition mining plant solutions permitted for trade mining they are covering visited .power mining coil copper etc

7. 14.1 Dti industrial trade gives that permission

Department education and go department. Any proliferation for trade.

Development infrastructure for student's .city power cable trade in appliances

Coverage human resource city power can be claim to data labor department mining department for student visited extra time work over time on training city power space municipality…power explosion…government.…steam mining geotechnical investigation earth discovery in natural they are covered insurance student visited places and personal trainer learner working visited electrique engineering.. Technologies science innovation.

8. 19. Purpose design integration. City power. Study information on line career.

Home customer, tender city power career.

19.1 applications for electrical services responsibility for providing electrique service to property owners in the city power. Billing service division two categories namely small power uses sup and large power use plug electrical services connection no greater than56kva in general type of connection.

-Apply to convert a sup form post paid to prepaid Billy

Apply for new prepared or postpaid dupe connection.

-apply for a new connection.

Region revenue…

9. 19.2.. feedback.guyser control, meter reading.schedul.tarrif info, prepaid vending, energy type, fault Loggins,load shedding, library, claim,tarrif info, tariff library , monthly meter ,meter reading,
19.3 meter estimated...
Company secretary m smith. Executive director,
.. Registration number 2000/3005vat numbers
Insurance claims form electrify account number, prepaid meter street,code,postal address, city power number, call centre , description of how the loss damage, occurred insurance repaired replacement quotation .
-leadership seniors management team, compagny.media.
-theory city invention metering city old metering power.daig business with city power,
Supplier vendor providing services,
- company awad.compagny registration, originally tax pine, relevant,I'd,direct,B-BBEE,tender.
10. -20.Hearing conservation programme.
Training awareness and induction programme attanded.noise exposed registered audiometry.during induction.
_content ..loss, regulation city power
-trainong shall cover,
Content and scope training of the ihl regulariion records
.10.-21. request for quotation
Name date post, closing,tender, description, additional, business plan, quarterly report,AGM,red year report, annual financial statements, service level agreement, staring period, endings period.
22..Application for electrique supplies stand number, township, building name, street address type use, residential, commercial, industrial,
Customer account.customer meter tick
-New service connection.
New service connection, single 80A.tree phase 80A, prepaid convention.other...
- Convention single phase 80A, smart metering, repositioning of metering single 80A,
-up grade download of supplies existing am requesting.new meter box boundary existing cabling.
- city power agreement supply of electrique applied for is govment by low application liability according, routine monthly read, notification, connection, connection objectivity, registration,name domestic customer service connection not exceed 56kvA3phase ,80Am to supplies R1200, outcome.
Customer log fault
Measure the power of learning and criterion are registered trade mark of education testing services. prepare for criteria asservissemnt test exam skill. Discover practice full. Employment testing services are design engineering aptitude minute test design, criteria
Type, test measure trade mark holder. License electrician assessment, apprentiship.license electrician theory and license practice. Wiring meter box sub and switch boor, men system, comment licensed, week basic licensed including readings comprehensive test numerical reasoning test
Trade apprentiship.problem reasoning perspective math.mechanical.electrical.physic.
Questionnaire company qualifications question theory electrique test power current.
24. Fault find and protective. Control circuit...
-Installer rules: PVC flexible conduit isolating switch correct factor Sep
Cable burette, depth cable, cable installer.

11. 22: metering error connecting prepaid, over load, no power accident on appliance power metering consumer procedure claim fraud crime metering
Logged call, off metering minutes,
City power and Eskom on line metering recharge prepaid:
Compared metering old analogue indicator kWh day daily check by service accountability kWh building account energy meter take 1day20kwh room house estimate ×360days7200kwh years energy heater consumer indicator safety key lock metering analogies reading value 7200kwh, to rand cost Bill discount prepaid cash metering return back tax vat customer consumer building large medium tax redistributed 3200kwh real amount prepaid on metering digital. Customer’s pays money 10rand have 3kwh to 5kwh, consumer readers
.. electric wiring factor building installation electric and appliance design supply need real time cycle for that discounts technology cable police respire main tenant old cabling equipment years 10yrars replace cable high voltage transformer to cleaner reactance synchronous machine on designing reader's kWh 7200khw coverage policy main tenant check point kWh lighting was default fault appliance claim and fault old system design by networks system city power in interconnected news

building and account nest number industrial news technology need to claim visited plant,,tpm engineering design AC DC current step task creation operational curent assessment
24. Purpose comparing estimate:
Designing and investigation: electrical power transmission network: protected and controlled high voltage circuit breaker inside electrical grid substation relays scheme can be complex.
-oil minimum circuit.
-overloading excessive, curent not due to faults,
-short circuit fault between phases, short circuit,
24.1 classifications
- Oil circuit breaker OCBS, vacuums circuit,
-SF6 circuit breakers
-air circuit breakers,
Oil tanks in oil circuit breakers or normally, oil is very good insulator has high dielectric electrique strength, cold oil is able to act as on insulator,
C... design
Good quality as below,
Good heat transfer Quantity
Short arcing time
Comportment
-high voltage used service, on circuit rating 600v, standard 4,160to 765,00v and 3 phase interrupting 50.000to50, 000,000kv,
Electronic symbol circuit breaker...
Transfo MVA, found in substation 600MVA, 3, 6 35 kV industries,
-switch disconnection. Use control section switchgears panel...
_Construction...bulk oilcinductor bushing, fixed contact, moving contact operating,

Vic vacuum circuit breaker.
Oil circuit breaker less risk,
SF6 current breaker very less,
- Mechanism operational, insulator, arc contact, frame lane contact, hand operator, electric solenoid, frame, Erie tropical,
SF6, high sulfured fluorite, is air interrupted...

12.   29. Conceptual problem conception assures efficiency conversion of solar, steamer thermal hydroelectric renewable energy electricity lower acceleration rest...
Integrated concept light draw power consumption.heatet calculi power dissipation operating bulb time costrb, cost appliance electric fusible.
-Rating fusible high voltage relays protection advance:
Z, impedance cable breaker tranfo, conductance fault detect

12..**Generation resource .network transmission system**
Time table engineering science .physic engineering chemical, electrical engineering.
Mathematics engineering, apply to the career outcomes skill to make a agreement arrange power city training visited engineering estimate resource internal and compare additional system explain reasoning engineering in point
24. Mechanical designer process equipment, area removal. Physic engineering .area...A1= reinforcement area jacket steam
.

Descripton unite	**Yes not**
Designing plant and economic chemical engineering and physic Engineering limited for corresponding limited years analogies computer. **Specifically internal energy u to system robe do/St rate kinematics rate input to system (U1+g1+1/2v) dm1/dot... (U2+gz2+1/2.V saque).DM square/DT** **(rate of energy input)-(rate of energy out)=rate enegie chemical plant large quantities heat 150 degree Celsius ,1000kwh shaft delivery steam turbine power...**	Estimation system

10 bar /400 degree Celsius..generator 1500v.. Diffuser,super heater .. dQ/dt-dw/DT=F square (H2+g.z/g1+1/2.vsuare)-f(H1+9z/g+1/2vv2.v1 square./g) Initial interest rate percentage n program computer print out following in job map ..voltage.. Emergency system energy .compare Electrogene group motoring test compare fuel supply direct bore store 98,5/1040,,cubical capacity 3200cm square, compression ratio 17,oto1, valve gear d-0-ho valve. Engine output max power peak150 kW,118,power peak redli e 3800/440^{0},mac torque n.mm343, torque peak..test Applied thermal engineering fuel tank Nth=hbh/htx100,,,swept volume. Vs=π/4 .Dsquare.L 100liter, pay load 756 .homologated, Warranty and service 3years kWh ..kmh rpm engine power 3800r/m power/mass(w/kg)61 Power/litre kW/h38,torque litre NM/l (P.V/T)n.t=(P1.v1/T1) working .volume of .head...low conservation transfoy in system Audit overall applied calculate efficiency work.donr.Ew=F.d. P=E/t....Ek=1/2.m.vsquare.Ep=m.gh.. E e=v.i.t. Eh=C.mΔ.t.,. efficiency ¶= energy out/Energies input....power output/power input..low	

13. 21. Engineering systems modelling N assessemnt for engineering police in St peace college was covert by lecture note and sylabus reading
Introduction topics lecture note.and policy overview St peace college orientation guide and visited city power policy training circular note key learner apprentiship work job career.

21.1 framework and tools : scientific assessment making model exhiy -framework science police . Engineering electrical innovation Portfolio evidence
Implementation in city power training complain claim police case study training recall resolve conflicts safety security in city power science analyze student case investigation.scenerio in city power .
-Framework precautions : student prevention safety trade machine circular time table training city power learner prevent precautions visited development work study conducted trade infrastructure
-Projection: precautions preparation frame study. Air polutioning science natural.
-Project checks point gate point assignment engineering electrical:
- Case studies: engineering electrical council engineering and trade council labor analyze in government city power framework regulatory legislation: mandatory legislation police power and mandatory engineering power constitution go Gazette power attorney to work empower development learner
-model

14..22. engineering electrical: specifications of machinery equipment. Motor machine generation battery need to made verification
load cycle., duration electrique,time ,duty, continue operational ,periodic cycle consisting cycle of a time of operationel,load and time of operational at no load there is not time energetizer and recycling and reacting in cycle duration factor,100tn+ v load cycle.
Duration time electric lost electrique breakdown, on period operation load time inertia factor breakdown=power receive methods effective load applied to the motor thermal relay contactor
_policy maintenance engineering remanufactured tom cleaning meeting do check action take activities equipment breakdown re valuation. System products city power breakdown

energy metering guises break down .student breakdown exam weekend over load. Operation excessively.net operation .time net,

22. Engineering electrical planning organizing days shift task activities development system .day visited city power week.week.week.week. CVS

Step task check revision
Electrical engineering.ac DC machine engineering. Motor generation machine conduct move DC generator operator satisfactory a motor fundamental speed equation in put output,
-parallel circuit distribution engineering reactance resistance impedance suspectance reactance total admission power factor circuit problem. In the find
-Tc parallel AC generator balance magnitude heat, phases system: P√3.E.I cos phase power transmitted two receiver two single phase ,transfo secondaire A.load circuit source,If√4.l/c non oscillator transient.
AC ,time of the rms I/√3.Im..
Company Serie circuit power distribution total suspectance,admistance,theory

Engineering,zA,z,B,zc,,(a+jb),,,(c+JD),,(f+jg).. engineering capacitor operator angle free.
Development Serie resistance impedance equation compare loop linears ,sum junction
R1+R2+R3+......series 1/R1+1/R2+1/R3+...parallel
.z1+Z2+Z3+...1/z1+1/Z2+,1/Z3.../G1+G2G3+..1/G1+1/G2+1/G3..../gradient vectors
Developing Ra+RB+Rc+=Rsh
V(RB+RC)=v(Ra+Rm..
RB+RC)(12-Im)=I'm(Ra+RM)R(Ra+RC).
=I'm(Ra+RB+RC+R)=I'm(Rsh+RM).

Descrition	**Total unite**
Engineering,zA,z,B,zc,,(a+jb),,,(c+JD),,(f+jg).. engineering capacitor operator angle free. **Development Serie resistance impedance equation compare loop linears ,sum junction** **R1+R2+R3+......series** **1/R1+1/R2+1/R3+...parallel** **.z1+Z2+Z3+...1/z1+1/Z2+,1/Z3.../G1+G2G3+..1/G1+1/G2+1/G3..../gradient vectors** **Developing Ra+RB+Rc+=Rsh** **V(RB+RC)=v(Ra+Rm..** **RB+RC)(12-Im)=I'm(Ra+RM)R(Ra+RC).** **=I'm(Ra+RB+RC+R)=I'm(Rsh+RM).**	

PMMC..is essentially a low level DC , parallel instrument..VM=Im.IR...
-Engineering transfor system.comparing power distribution assignment watt output average output current wave line secondary statement a(c). Delta, delta start. Start delta start star. Zigzag delta zigzag star anaphase...auto tranfor .courent voltage transfo high voltage. Equation load circulating switch transfo.balance load application of.postef
Electric technologies

14. 28. Compare training assessment and assignment engineering electrical to implement time table workplace workshop academic in trade social city power design factor training

15. 28.1 requirements: subject and module:

-supervision in industry

- Industrial orientation
-industrial organization trade theory electrical, electro technique mechanitechnique language compulsories a, language business saga NVC level national...
_anted :for subject engineering:
Anted care educate training facilitator, and learners port
Practically college academic: philosophies practical school guideline employment learner
-28.2 what are didactique strategic investigate multidisciplinary. In development goal construct training materials and evaluation, how the model is didactic expertise as aspects education didactic of instruction and facts authority and telling authority written.: implementation circular St peace college didactic material framework regulator tools assessment for learner and trainer system information, file material metering to material didactic city power and Eskom material training education support .method measure instrument of evaluation. Visited p999ortal career scope assignment goal value cable population city electrification attendance is available. For employment
29. Methodologie .more
-Orientation guidance school ,organization lessons ,compares organization supervisor industrial in St Peace collie regulation City power training:

-Lesson plan grade .and class engineering technical Grade 12to 9,, engineering nated classn1,n6,. Level 1,4 ,
Lesson plan technologie
-education technology matric and trade
Engineering app video course ressours.
-projection orthographic.. orthopadagogic , orthographic isometric
Orthographic drawing,
-activity , subject area orthographic projection is a technique used spatial vision three dimensional object,can be convent,
-Lesson plan it association of training plan : projection city power light metering ,gysez planing and subject module required trade theory electrical module .wire premise power factor consumer plan.inatruction didactic form city power assignment:
-Orthopedagogy pedagogic
Module week:
Daily 5: planing and preparing lesson to include
-view lesson planning is critical activity for prepare Childress
High phase Templars described.
Key component : city power care training practice.
Explanation overhead or projector used keep.

-lesson plan: is a document that outlines the contents that your less step-by-step student teacher
Lesson plan is usually prepare in advance either cover one off , activity,entire lesson ,
Lesson St peace college unity in trade training
Day visited week visited.primary include activities
-lesson plan: board city power metering days care visited St Peace college module subject integrate Portfolio assessment Activities.
Objective lessons goal feedback science lessons anything from, experimental to monitoring or to diagramed
Lesson plan run smoothly.
-provide reflection: in the lesson greater way.. Lesson metering system city power goal megawatt and city appliance compare lesson module plan at peace grater.
Break project down .module time table visited plant operations and break.sectiin checklist,
Learn number life student complex, activities all orthographic drawing quickly grade level (9-12).
Required 45 minutes subject area geometry problem solving share bottom shaped

3D objects copyright engineering are connected, activity view isometric,
Pre assessor drawing challenge..
Circular police assessment.
-management system information:
In St peace college and integrity police system saps and city power , technician indicator persal personal police employment system data base.polfin police financiaire statement, training goal product humain resource and Indicator number titles
-indicator building management implementation
Indicator criminals dismental lab ,
Career secret purpose involvement laboratories indicator laboratory indicator training incident system support evidence report directors t implementation.... city power indicator trading lab record keeping finger print training student and St peace subject record clearence visited day working to report crime togheter,,,,method research crime evaluation in time table script transcript component fraudulent module appliance in city power and report over load required.

_29. Teacher vocational: guidence counseling interview verbal communication career design in training city power and St Peace colege learn more career outcom engineering electric subject nated

exhibition engineering generation transmission power station.electrician engineering to city power engineering career
Questionaire design what is leading to pursue a career counseling have excellent written and verbal communication skills approach counseling assistance stator management attorney audiology ..what are the communication skills communication,wath guidance counseling characteristics off effective guideline counseling interview School may be focused on graduation and , career, balance career teaching that employee look for candidate, including college professional,
Caracteristique Component Company engineering electrical: design generation transmission in training power metering design caracteristique level
. Stability. And with the principal key power: load over load rating , switch,
Company..

15. -29 required management trainee class and company training
How to management and control during teaching
-how to organize teacher filing cabinet training room trainer room libraries visit to .
How to organize a lesson plan . Trading
Material , library training and report form city power organization, implementation trainings and St Peace college textbook reader module trainee
Description management and control a class during your teaching filing system form city power Eskom, compliance form issue filing day week evaluation and certified lemons instructions metering

Assessment functions
15..22.Requirement: implementation and stabilization to training visited trainee engineer, education..Anted examination training and labor inspection work inspection police inspection school ,compare industrial city power go inspection
-general inspection category: and training schedule,
Carrier training adducting modified I is additional training practical applications,
-cycle of training application auditing , visited plant operations
,Step may take long or short time completed all operator must develop the ability to detect the ability detection abnormalities positive result achieve by student visited places working training system main tenant power city equipment in good condition and St peace good performance examination time table assessment,
-autonomous inspection step 1,3 tentative inspection standards compared reevaluated to eliminate, detection and treatment of abnormal condition,
Minor servicing of machines ,molds, gigs and tools .
_29.1Organisationtidness, autonomous maintenance.
Focused and elements:
- Operators responsibility organizing stand for operator responsibilities adhere to recording.kwh
-focus work and element promote organization and eagerly operation visual control work in control process product kWh / reader.
-measuring instrument and foil proof device, element inventory measure instrument proof device and make sure they functions properly inspection and correct deteriorate kWh metering city power training is work ,
-focus equipment precisions ,operators must check precisions of equipment kWh metering geyser is précis instrument,
-operation and treatment of abnormality,
16.Requireded hearted meter energy breaking component

.destruction.
Conductor.insulation.maneticfield .
kWh/ ..joule input copper wire..component heater Peltier .break.explosion system, limited stability load . circuit breaker load heater Peltier thermocontrol....metering limited breaking ,
Air cooling system breaking linear systems circuit wire cold.component cold ,,220v .6,6kv..Peltier heater load 220+20volt Peltier 240volt reactance heater system..

Operationel,
wrote:
34. Required: labour training quality body assessment,driven machinery regularite safety 1993,acting in term code practice., director.

17. _ content training city power and St peace practice assessment.quality body insured,duty authority and duty acreditation.saqa and sasseta institut sets mseta seta labour skill development field of activities.
- training system record detention,time table subject learning reading
Lifting machinery .and machinery manufacturing management.
-codr description.
Counter balance lift true ,rated capacity of 3000kg reach lift truck..covoyer logistics lighting ...order .
Machine code compagny capacity .
Pre start check detection ,
Pre operationel test in control,total item uncheck theory ,penalties ,UN heked,Pre assessment X2= maximum,
Total Pre star and operationel, practical x time penalite item not specific ,penalite,body stack,fail stack correct position for travel close remove close down total operationel,time .insurance logistics.transpirt Riggin material construction supply...

Drawings explanation: building compare St peace college knowledge design analysis investigation.aystem engineering and trade theory
Designing system engineering electrical drawings,mechanical drawings, building drawing . orthopedagie . lesson.orthopedagogie.system module activity.. reproduction analyse design.

18. 32. Required operationel Appliance customer to city power and more St peace college time table reception and attandance assessment engineering,
direct energy conversion system. The direct PDC MHD conversion system s.
Plasma dynamic conversion system is a method of conversion system is a method of converting thermal energy plasma in to electric power without magnetho thermic .display energy bulb electro tube basic electrical energy government watt solar she produce 03to0,4 kilowatt,
- insure generated energy
Lab segment development. Power of about 93kw, government RSA provide 50 watts solar home system rural bee20-30%renewablrs variation analyze method, input data,
Input scenario energy demand yes supply option yes ,use interface ,mesa database, reference energy ,tech coda parameters,messa gematrix , emission, new installation, result storage data ,option for supply electricity rural homes area 0,4 to 0,5
- Department of energy found total uncle trifurcate house rural unelectrifier,
Total population 0, 31x061=<5298 millionxo, 32x0, 62=1000, projection house hold bee

19. 33. Thermoelectric effect..generation product natural appliance vs metering effect energy.
Dc. Vs PWM supply type recommdation manufacture comparison of two technical control lin 25k ears vs system .
I/max when dt <25 .
I max should there 0,33, I/max ,dt >, I/ IMAX should ,0,33-0,66 IMAX coefficient of performance,CoP=QC/pel
Performance vs current,
Thermal controller heating,
Linear vs SMP tech controller 12.A up to 2x16A.,
-33.1.Design process:
-Estimated heater loard system appliance and power total
_define temperature.appliance and metering power system
-choosing a Peltier elements.
- heat sink
- calculate
- temperature sensors
-powe suply requirements
- Thermo electrical cool
& Design a complete system estimate appliance guyser ,fridge and steamer system
-Thermo electrical material build .
Operationel principle, construction desig material,
Designing
-identification guyser stwMerter
-caracteristic,metery
Ie
Benefits: function heater exchange, uses consumer production industrial , science.
-object yes , metal plate yrs, Peltier yes Q,heater sink yes Q.rth ambiance,
Estimation load dynamic,dQ/St. Load QC transfer THS heat Tamb+ΔTSH
[K].dt=THS -To=Tamb+ΔTHS-T0
-COp=QC/pel..Max.min Pelton
dI..IMAX=68k,lmax=5A,Vmax=1,5A, current and voltage,I=IMAX (IMAX)=5Ax0,45=2,25,

V= pel/I = 16,7w/3,83{7,42
Heater sink elements we need knowledge,
required heater rejected vs current
Qh/max=max=0,6..
Qh=Qmaxx0,61=41,. ..
, Operationel
34.requirement metering
Logic system Min Ter max term .
Control logic loop

Analyse function asservissemnt,radiotech
radiostasie.

35requirement operationel , information
management system,, communication skill
admi telecommunication computer ATM air
time metering design transmission data
system policy
Control source traffic function Arriva

-Policy map input voice class voice not
gateway interface ethernet,
Service police input research priority yes,
-ip on existing
-inputline wath
-policy output data ATM .
Class default date, use ,attack ,account,queen,
delivery,dial session, description, switch port
access, describe rout age, passerel.police
regulatory communication metering appliance
vs metering city power communication data
systems ATM process framework
regulatority.over load transmission.dischage
bill delivery, plan number control ,
government implementation gov taxation
government ..
Police detective microcontrol VDC, Di/DT,
fault..
-- 33.2Required.analyse circuit system lineare
limited Saturation vinput v output.permenent
network input output meseare,
Qmax,e(t)=u(t).s(t)
System lineare relay delay position circuit
analyse metering heater guszer .
System aervomecanism position.plc
Mean...e(t)=e(t)-r(t)=
Input output ..
E(t)=E.sin.to
S(t)=S.sin (Wt+f)

DC system transformer tension speed
Re

e(t)=v(t).s(t)=t.wt..command v(t)..

Equation different linearity metering input
system output system appliance ..
St (St).v(t).A.(t)=w+w..
Database data send kWh rather system send
kWh ether reception transmission
telecommunication..policy relay delay
discount value 10@r,2,5kwh ..input 10kwh
10rand buy system 8 rand transformation
system asservissemnt.retard line power cash
time arrival policy network.. system gov,

Metallic layer fabric oxyde metallic alluminuim
material R=¶.l/w...
PCO=vcoxl....Vco (iMax/2)...n (po/p1)x1000;;;
vccmax -vcc/vcc

Requireded : engineering science physic
chemical.. electrical..power machine

:
Construction architecture design file
development.system input unity, control
memorandum ram Ron outputs CTR display
print,
- data cou,ram ,rim,I/o,. 8 bit but memory
system.logic diagram ..
Engineering potential coefficient result and
reducing voltage integration buy factor
3/5.initiL x = chart capacity .evoltage voltage
solving different equation, 5
DX/St+3x/5.equarion incase voltage
DX/DT=3x/5.reauired output integration, full
scale voltage 5 bit d/a covert 0,2 volt digital in
analogy 1111 ,SB = 0,2:full scale output
=31×0,2=0,2 A event bit D/A delivery an
output current, 100mA,let B=10/20=0,5
mA ,,1110=29×0,5=14,5
Analogue computer camparebdigital computer
..
Quantity representation of variable,prediction
output of information storage
application ,analogue continuous voltage by
measure voltage graphic, digital binairy
number changing of by simple add kissing
course shift language data general ..wireless
communication .
Metering and supplies electronics .

R=¶l/a...π. d.....s=2π/d... screw..join cable make conductor...gauge...cable
Density.volume.. d section across voltage mass cable kg , volume cubical cable cm square , area
surface , meter cubical. Copper.aluminium.zinc.plomb.
Oil .water ..
Join cordon cable ferulure.mass join step make conductor .
Skin effect ,Courson effect,joule effect
Resistance to power current. energy..

P=R.I. T....

-test cabling material stress test eprouvet MPa cabling effect

deformation elastic plastic .PVC polymers polyvil caotchouc .insulation papper material insulated cable join .plastic 220 volt
Plastic.ceramic insulation high voltage glass 1500kv

F= Qa.qb/r... €....
Cable
Mechanical resistance alumelec..maichor ..transformer join
Conduct hearth
Deielctric.isulator charge discharge cable .high voltage discharge short circuit..
Magnetic material.,field electromagnetic
Insulation conductor magnetic hysterisis ferromagnetic, H..b.i.u.,.
Coil making ..

Number support kV..number substation.

On Fri, 14 Apr 2023, 17:58 TSHINGOMBEKB TSHITADI, <tshingombekb@gmail.com> wrote:
19.. 47.1.Requireded: operationel subject field saqa . seta implementation
Saqa award certificate.
Assessment conduct seta
Saqa award diploma certificate n engineering.and
St peace college training skill.mseta CHIETA.. development panel and control wiring
Level engineering electrical.infracture development. Meeting saqa requireded I'd..no meeting statement skill development.id certificate award St peace college .db box outlet socket switch dol motor.transformer.
Control instrument mechatronics,
Career development city power graduat.implentation .career
Continue trade skill supplementary trade meeting month trade . foreman

ID: 258968 saqa commissioning domestic or commercial .
ID: 10259 saqa fault find repair and maintenance tree phase , electrical engineering.
ID : 263006 saqa ,demonstrating wiring of premise defining
ID : 258937 ,install ,maintain low voltage,DB protection
ID116466: inspection and circuit ,
ID: inspection and maintenance control and control panel and circuit ,
ID111388 :saqa electrical engineering and construction
saqa I'd 67461: N3 code instruction category meeting ,A,B,C,..
Level2,3 ID : 258937..plant generation , distribution, construction mining chemical and energy sector, maintenant,DB, protection,electrical safety cleaning,
--scope of work specifications.sans 10142,
- circuit breaker ,isolator, contractor and relay ,install Db , inspection Db ,
ID10607, 10605,10634,
- replace fault
-ID 116434: control electric network from a control electrical . Centre sgb ,power plant .field manufacture engineering and manufacture.
-Switch way panel wiring education technology.
I'd ,electromechanic .electrotechnique .. teacher I'd .saqa .

-47.2.requirement n diplomat engineering.
ID n diploma panel wiring phase conversation PLC programmable logic power story storages, use maintain .graphic diagram design, St peace college outcome career generation power station and
saqa award degree diplomat continue supplementary assessment student subject choose trascrip record no meeting engineering electrical diplomat dhet . Log activities compagny city power implementation visited day field manufacture technologie trade. Training

- interpretation drawing electric code graphic.

Purpose. Assessment : explanatory electrical plan create electrical plant ,
Content ,wath is purpose benefit of electrical , metering city power and St peace college workshop
- how to draf an electrical.
- tip for making electrical plan , interconnection of different component and fixture to the system .in training cooperation.visited
- power line with details such as size voltage ,rating , power transformer and winding ,the main switch breaker and fused switch,
- draft ,step layout scale drawing room ,cabinet ,step 2,plan it advance your electrical plan, step walk your pla building.,tips for making electrical furniture light switches and electrical outlet,
- plan for additional outlets renovation,Amount table Lampe,yea,later ,appliance wiring plan,
-electrical plan legend
Celling mounted light ,duplex receptacle,telephone outlet switch.
- basic electrical plans ,
- patients room electrical plan create your electric planfirm a patient ,
Basement wiring plan
--when listings out item such a feeder breakers and wire size,for particular project piece of distribution equipment ,
Intern of electrical distribution,
-schedukes are often included switch board and panel board, drawing to list number of circuit breaker load feeder ,size and number of wire ,
Project
Schedule usually expressed in tabuled,organised self explanation.
-typical ref, legend and
- build drawing s:
Construction project is completed is revised drawing,created and submitted,constructor ,high,any charge
i-nitial design drawings .
-Construction process completed .
.
-Electrical drawing and schematic.
-designing installing troubleshooting electrical system requirements use variouse ,line represented.
- design engineering and technician use schematics to build and troubleshooting
-one line diagram: medium voltage switcgear one line diagrame , and power systems single diagram.
Is often drawing flow of electric.
Typical: major components in the power systems list system voltage , transformation impedance , interrupting rating and fault current just the basic .item
-Drawing should be kept .
- main control room of a
-switching operation buy identifying feeders and the load they serve,
- system voltage frequency phase and normal operating position line diagram,
- for more detailed view of an electrical distribution system,three line diagram is used phase polyphase A c , system drawings, connection.
- diagrame show distribution component such bus rise ,bus plug ,panel,board , transformer ,small ,branch circuit, drawing alarm, system,

-schematic diagram
Purpose: man schematic diagram emphasis circuit elements function relate components, series or parallel
Found ,inductor ,diode ,logic gate, fuses contact ,switch ,every circuit,

-circuit breaker control schematic:
wiring diagram.terminal for selection terminal ,relay ,load detector relay wiring diagram .
-main purpose of a wiring diagram electrical circuit arrange, schematic diagram,
- wiring diagram ,part , device terminal strip, appropriate number,letter,colore design,terminal and connection between the components are clearly,build repair ,
-Block diagram: reference input filter sum ,controleur actuator process plant, distribution,sensor,

- arguably ,basic type of electrical drawings block,diagram, components of complex systems,form of block,internnected,block provide a conceptual,idee a process is completed, electrical,
Symbol.
Represent schema
-logic Diagram: current gate and logic gate clock
- breaker faillure relay logic diagram .
Modern protective relays utilisation diagram to represent complex circuit process .electrical.
- schedules.

A buid
Electronics use soldering.and desoldering . system..welding iron ,solder ,silver,or copper lead , desoldering,plug ,outlet ,cleaning disconnectorb,connector.printer circuit fabric film microship process. Silicon.plastic molding..
Fit recess .fit wiring .process..
Control
- instrument method selector design metering process

Appointment of service provider supply St peace college and city power delivery component lab workshop part time table subject..
-introduction golbak stage St peace college .
-Scopes of project: projection requireded supplies to purchase and deliver total ,.
-Special condition component
Subject module metering
4.purpise documents.
Budgets: a projection budgets St peace college city power time table   fee.burasary.close graduation internership fund student.gov
-Quotation value tax (vat) project :
_time frame project is to commence success bidder
Firm price subject , name of the compagny quotation close
Appliance and compagny subject.
- item description of good part number quantity
Evaluation criterion (80/20).
-request for quotation number
-limitation to quote supply and delivery
Item/ description of good //quarit///price/// bid price RSA
001 /engineering electrical practice workshop projectye engineering open view lab test lab and workshop practical saqa .dhet training exam papper .seta . asssessment police //// amount estimation fee
Total include .8modul x 24subject x3month 200 projection years aman's test experimental technology.training integrity one project ..
-deliveri period
Specifications requireded for project:

Item,
part numbe
r, performance b,
size,model
Inlet .
Outlet .2.12

-
:
T=1/lamb.ln 2...

Unity design	

-
:
Metallic layer fabric oxyde metallic alluminuim material R=¶.l/w...
PCO=vcoxl....Vco (iMax/2)...n (po/p1)x1000;;; vccmax -vcc/vcc

Requireded : engineering science physic chemical.. electrical..power machine
E=T1-T2/T1=100%. ,
VP/P=VRT/m=v..sq
Efficiency=w/Q=1-T2/T1×100%
P1.V2/T2=P2.V2/T2
W=W=P1.V1.lnV2/v2..
SF=4,187lntf/273..
T2/T1=(P/P1) exp r-1/r
W=P1.V1-P2.V2/r-1.
PV=M1.R.T
Q1=m1.C.ΔT
Q=m.l.v
U=m.C.V(T2-T1)..
(V2/V1) exp r-1=T1/T2,
¥=CP/CV..,
R=cp-cv
W=m.R.t.ln (P1/P2)
P1.V1. exp r=P2.V2.v2 r
W= m.R.ln V1/v2.(T2-T2)
f exp 1= fv/V-v
f exp 3=f(v+v)/v
V=\.f
f= C/2.l
V=√¶p/p=√¶.R.T/m
V=√F/u
V2/¥1.=V2/¥2.
f=f(v+Vo/v+vz)
f=1/2l.√p/m
E=F/Q1=Q/4.п.e dr..
Electricity.
W=Q.V........E=m.g/q.....Ek=w=vq
Q=C.V.....E=h.f........F=q.E.......E=1/2.C.v exp.........V= m.gr/Q.......t=R.c.......S=w/F.....r=Q,/4.п>£or
V=k.Q/r...C = €r.€o.A/d.....F=k.q1.q2/r sq
Ek=Q.v.....e= v/d......1/c=1/C1+1/c2..........v=|.f
W=1/2.Q.v.....m=EQ=(V/r).Q....C=k.€.oA/d.....q=F/ m=EQ/m=vq/SM.....
W=vq=1/2.m.v sq....@= Q/4.п.r.......w=2/2.c.v.sq
T=1/lamb.ln 2...

:
Construction architecture design file development.system input unity, control memorandum ram Ron outputs CTR display print,
- data cou,ram ,rim,I/o,. 8 bit but memory system.logic diagram ..
Engineering potential coefficient result and reducing voltage integration buy factor 3/5.initiL x = chart capacity .evoltage voltage solving different equation, 5 DX/St+3x/5.equarion incase voltage DX/DT=3x/5.reauired output integration, full scale

voltage 5 bit d/a covert 0,2 volt digital in analogy 1111 ,SB = 0,2:full scale output =31×0,2=0,2 A event bit D/A delivery an output current, 100mA,let B=10/20=0,5 mA ,,1110=29×0,5=14,5
Analogue computer camparebdigital computer ..

Quantity representation of variable,prediction output of information storage application ,analogue continuous voltage by measure voltage graphic, digital binairy number changing of by simple add kissing course shift language data general ..wireless communication .
Metering and supplies electronics .
Re
:
40.8..Requireded: award degree diploma
saqa qualifications I'd : asssessment no meeting requireded.transcript completed supplementary subject : foreigners transcript.saqa qualifications I'd :71638.
Higher qualifications.
Primary registration status,saqa decision number, saqa 091/21.
Registration saqa assessor conduct certificate .
Saqa I'd instituts foreign.no meeting instituts accreditation saqa decission.
Admni /30-39 NC's.
Total credit .
-assessment policy IE099-IE00.regular internal,
Saqa decission 10105/14 advance diploma intermediary phase teacher.conduct...
.n1-n3 national certificate engineering studies.
-N1: Saqa ID6710, N2 saqa ID 637375,N2 saqa ID 67491..Entrance...
I'd saqa award diploma N ...
Ncv assessment plan isat .
40.7.1.Subject.. assessment task test assignment internal external assignment .assessment tool. Marking memo rebruc ,,.. topics subject outcom. Topic 1,2,. ,time and marks allocation 1h marks...examination training training formal. ...training exam rwiten permit and time table practice exam days.
Fundamental subject ..icass .time frame, asservissemnt activities, scope assessment term 3, suggestions allocation .analyse grode..
Isat integrity practice..time frame .allocation require ..

41.1..required city power vacancies
Estimated ICT service
Research inovation:
-table of content .
Graduate internship
Training center employee.visitor student apprentiship visited education technology high school and trade development school skill training .trade education career outcom exhibition engineering education training.
1.city power vacance 2023.for officer special and variations use career opportunities.
Training oppoy . metering guyser . light city .training engineering career.
1.1 How to apply for city power vacances 2023.. student career granted.
-meter reading submission: St peace college time table engineering electrical Portofolio evidence low consumer panel wiring customer and plant experience design cost power factor demand reader implementation in city power loop .. interlock system.training partnership test . outcomes career student generation power station transmission trading .
- city power workplace ready to light up career artisan engineering.
- name of profile
- city power .
-manager vacance.
-city power officer vacancy.
-city power specialist..

:
40.10..requirement : implementation
--SAQA module award diplomat
-Award diploma n.engineering electrical
-Award instituts foreign decission saqa
-registration .award saqa n1,2,3,4,5,6.
-Award meet documents.
-Assement assessor saqa conduct moderator
I'd: 202001305040/20191130002
Dhet exam nated: 201000203812/2004007064381/2011007434332..

40.10.1 requireded of work experience logbook instructions programme code 5090840..national n diplomat.engineering studies electrical I'd :90674.engineering studies NQF level6, 360, credit saqa learner I'd 67043 national electrical engineering nqf .level6..learner
name :tshingombe Tshitadi
,surname : Tshitadi Fiston.
Number employeer :
Details compagny St peace college city power:
Name signature…

Trade test technical environment
Date : ……………… sign…

1.code.wA.0201
Purpose asssessment entry Scope.
Assignment question answer assessment evaluation qualifications St peace and city power metering

Interpret technical drawing: .evidence checking the drawing confirm relate equipment in accordance stand operationel procedure reading information written .
Design db box outlet socket .

2.undertake numerical undertaking numerical operationel geometry and calculation formulae
Scope .
Terminate and connect electrical wiring
Date .
Signat
Material conformance checking and existence new installation site correct location.
Specifical
W0302 checking existing and new installation .making terminal,connection. .
Specifically .
Manufacture.adjust and fixing wiring support tagging and labelling cable,wiring ,conductor and connection .undertaking , specifications testing of wiring and conformation to specific . Connection for conformence to specifications.use language .
- interpreting circuit,drawing .preparing work plans in accordance with legislation and regularite requireded stand operator.using measures for installation testing electric wiring circuit .testing wiring enclosure and support system .indentification compliance relevant ,energising testing installation identify rectifying.completing report and documentation using short circuit comment relevant terminology,considerant plan Ning rescues or provision of assistance,isolating electrical hasard safety changes controller operationel parameter ,
Conditions air and refrigeration electrical special dues trade that lead diploma need experience ,
-Construction high voltage installation .
-substation ,
-pane wiring
Armature winding ,

-A. Running test function and recording fault and or equipment status indicated by buil in test function . equipment sub assembly, components connection and terminal ,
-removing replacing components and termination for confoi,isolating electronic , returning calibration electronic equipment sub assembly.recording ,obtening relevant circuit ,schematic manual ,isolating tagging ,and verified.refitting sub assembly ,
-specifie sub assembly,schema electronic recommissuoni g electronics equipment ensure,entering routine electronic ensure conformance,
-drawing reading drawing job . documents listed.maintenance .single phase.

-Repaired control loop system look evidence that confirm skill.obtain and interpreting engineering specifical technical information software hard .data diagrame historical to system components and operationel.
Consultant system other relevant plant personal with respect to control loop characteristics.
Confirming function malfunction of the system.
Component . checking operationel character controleur device,signal conversion instrument and final control element .
. identify fault the control loop for correct operationel .monitoring the response of the control system , using appropriate fault find diagnosis technicien and procedure throut technical.
Monitoring
Comparing collected data.operational.
-engineering . dismantling..service item setting appropriate test and calibration equipment w..control mode checking control ..install commissioner the control interpre data calculating control loop characteristics.install calibra.access and final control accessing data sheet. Circuit.diagrame engineering.install sensor..identify cabling conductor .locating inspecting ..
Criteria

Trade manufacture seta merseta sasseta accreditation .saqa assessment training

-Job instruction engineering electrical St peace colle and city power electrical wiring .statutory and regulatory.connection support..
Method material.test wiring for approval work
Learning technical outcome.self checking .,
-activity log sheet.state following equipment hand tools . Desoldering tool soldering fiting welding pencils

Activity :voltage power supply.long Bose portable electric hand drill.drille EXC.
Flat screwdriver used driving or fastening positive slottel scree.flat screwdriver is used in driving or fasteriing.join two support lead melted around,side cutter pliers used for cutting or terminal wired testing .soldering .join cable .chisel.resistance .ms program..
-hNd tools label program.criteria .score .identify.tool...
Terminating and connecting electrical wiring and electronic circuit.test termination . asservissemnt criteria.
Practice...

Dhet..faculty electrique engineering.
Completing diplomat logbook.application application

-Subject : electrique trade theory, industrial electronics, engineering science, mathematics, electrotechnique drawing engineering..
-Logbook cover page.: St peace college
Exam internal assessment and external
-application letter :diploma St peace college assessment circular irregularite final award saqa qualifications award diploma , certificate.vist city power training career inovation trainings
-Letter from your employer.career St peace college trade practices assessment engineering.policy practice school engineering.

-date period work specifically subject n6; qualifications irregularite..regularite assessment.. Portofolio evidence

Poe: asssessment policy evidence low

-Candidate work 18month St peace college time table trading practice asservissemnt criteria saqa.
Completed duty .
-Duty city power St peace career patrol
.
Certificate I'd
-Summary: academic info n4.n6..
Irregularite assessment police Poe's relate low .

Copy statement 12; subject n4.n6 ..
Subject condonation award.subject irregularite trade theory .. transcript academic time table.. maximum one,

2.relevant work experience .apply for diplomat, engineering electrical note adminwork experience in government departments ..qualify development social.energy . education department asssessor, instituts

Unity description	Yes /no
Regulation %= (220-210)x100/210.. Equivenlent transfo..E2=I2.Z2+V2.. E2-V2=I2.Z2... _estimal 20kva,2500,500v,single phase tfo.winding r1=8ohm .x1=17 ohm. Wining R2=0,3 ohm ,X2 =0,8.. primary voltage 2500 ,. O,6 solutions E1=2500v,R2=500v. Turn ration N=2500/500... Ration =E2/E1=600/2500=0,2.. apparent power s=20kva,. I= S/E =20kva/500=20×1000/500=40A.. - -refering to secondary side. Ro2=R2+k.square r1=0,3+(0,2) square×8=0,62 ohm Xo2=X2+k Square=0,7+(0,2) square x17=1,380 a) 0,8 lagging Volt.reg v=12 Ro2cos #+I2×0,2 sin @/E2.. Volt reg = 40×0,62×0,8+40×1,38×0,6/60 VR=52,96/500=0,10592,. % VR =10,59.. Secondary terminal voltage. V2=R(1-v2) V2=500(1-0,10592) V2=447,04.. 0,8 of leading. Voltage vR= I2 to square .cos@-I2 X2 sin @/ E2.. VR=40×0,62×0,8-40x1,38×0,6/500. VR=O,O2656..%VR=-2,656%,,, Point to key Secondary terminal voltage. V2=E2(I-vr) V2=500(1-0,02656)=513,28v. VR..VR=12Ro2 cos @+,I2Xo.sin@/E2. VR=40×0,62×1×40x1,38×o/500. VR=o,o496...VR=4,96% V2=E2(I-vr) V2=500(1-0,0496),,v2=475.2 volt..	Estimation

:

40.6 management multiple backroung task and interrupt driven system. Clusters system information connection
. Monitor display , basic knowledge suggestions reading embaded engineering electrical.
-basic circuit theory ,fund arrest ,how to configure pin microchip microprocessor
Hard basy trainer bird work station PC running windows Mavis Linus 13v DC motor power main gate gate mplabx cross compiled spreadsheet excell log entry visited internal external St peace college engineering access and city power access meeting agendas menute .
- project takeaway : how to read analogies voltage compare to implement a capture period measure fundamental digital,open loop and closed loop process control ,
_ fundamental concept unit introduce process control electromechanic I/0.
Process control: automate process control engineering deal architecture..
Automate process .signal yes control loop processing microprocessor computer fax signal yes, signal yes amp ,signal card , process yes ,tacho meter yrs , open control yes record count positive yes , ,,
40.7 maintence inspection: components program,
-inspectiins check operationel back ,
-inspectiins lighting inspection:bulb regulatority exam control ,transformer hardware and and gasket exterior light,
Electrical inspection: being simple carbon monoxide detector,as well as flashlight and testing equipment timers and photocell, should be inspected and exhaust fan,
HVAC inspection bfiltrrbdict filer

41.purpose. Study case ..St peace college energy rurale and city power energy.
4.1. Electrical grid system design to provide electricite way from it generation to the customer system ground from design kilometre and connection countless complex interconnect.
Workplace workshop practical projection ..lab system fundamental
Test problem requireded..
Eskom and city power ,
-generation electricity ,power plan warn to convert mechanical energy of turbine into energy use generator except solar power , photo voltaic cell ,power plan ,energy fuel. St peace college workplace.
Test lab experimental practical.
Result recording operationel:
kWh ..kV..day

- transmission :large high power line are crucial component .power plant pass through stepped up voltage voltage increase in electricite by transformer .by distance with typical maximum distance.

Result recording operationel test.
kWh .kV.ka day

Reasoning step up transformer are used is when long distance a conducting.long distance.loss energy problem acceptable level,

Estimation Pre test metering transmission grid extra high volt 265 to 275 kV AC , DC joint power station 600Mw, and power station 600-1700Mw,,hydro electric plant 200MW.. transformer industrial power plan and medium size power plan 1500 me..interlock 110kv and up . joint connection distribution grid transformer 150mw power station metering city power plant , 2mw industrial custome power station , solar farm ,eolien farm ,rural 400kw,50kv transfo metring buildings house dispatch .

Estimation const inspection area building infrastructure.

Test lab open views stwich gears inspection fault .circuit breaker fusible ,Relais
Power system of electrical increase descrease note lab
Supply test month average costly
Methods use for switch control circuit during normal operation, permit to switch off on the generator ,transmission distribution equipment.
If faillure occured short circuit heavy current pass.feature switch .
Switch operate in order isolate health system b, discrimination,,switch air break switch medium,

- oil switch they operate in oil arc that occurred fuse joint ,anormal temperature.
Daily week time open ,time close date

- circuit breakers: switch can disconnect the circuit but it is done equipment which open close a circuit under all conditions like ,full a circuit fault condition ba circuit break can operate both manuelly can opere under high voltage type current .
Test day daily month ,

-relay: is basically a device or switch detect fault system then it provides the information to circuits breaker ,
- can operate to prevent the health .
Primary relay is connected
Relay trip circuit ,relay electromagnetic induction test ,
Type of switchigears,2 outdoor type,2 indoor type,66kv ..

Test transfer function is networks the magnitude,1/√1+T-square.Csquare. phase shift network..
Vi/Vo=1/RC/JW+1/r.c ..test close open system ..
Test generation : phase synchronous machine electromechanic energy conversion device operate on synchronous,speed,of rotating magnetic,field , synchronous machine,based energy, synchronous generator . synchronous rotor .
- NS =120f/p, f the supply ,p is the number of poles in machine,
Working principle
key principles
key features : sychronouse motor asynchronous motor ..self starting , synchronous machines excited machine requireded,machine two applies one DC , synchronous machine operate at constant speed called synchronous speed, generator voltage of constant magnitude can be operated, lagging, leading unit , synchronous motor relative, ,
Test daily week time load
Relever trade. Integral derivation day

Unity descrition	**Yes/not**
Equation of sychronouse motor . **V=Eb+Ia(Ra+Jxs).** **Voltage v.eb back EMF .is armature Ra armature resistance .on system day working duty shift** **-resultant voltage: difference between the voltage applied v.and back EMF,** **E=V-Eb,. Er=Is.(Ra+jx.s)** **Back EMF generated:** **Eb=ka.¶a.Ns** **¶a= constant of the armature,¶acmagnetic flux perpoles, NS = synchronous speed of the rotor** **.En=v normal excitation lagging power factor EB<v under excited.over excitation.** **Input power: input of synchronous motor** **.Pin=v.Ia.cos¶ per .phase** **.Pin = √3.v.l.Il cos 3phase ..** **Mechanical bpower in rotor** **Pm=Tg.NS** **Pm=En.Ia.cos(a-¶).** **.** **Pin =√3.vl.il.cos¶-3.I square.ra..** **Pm=pin -Ia.Ra..** **A load angle between en and v, angle between band Is ,the is gross torque products .Na is per synchronous.**	

- stepper motor Ster angle ..£=(ns-nr/nsxnr)x360.
Step angle the angles of rotation of shift .NS = number of stator / number..poles .Mrs of poles

Motor asynchronous..nr-ns/NR slop squirrel..star current as..z.c .p.
DC motor machine ..
Resolution 360degre/ beta accurate of stepper .n motor speed.n.

Requireded learner induction machine system engineering electrical St peace generation GB ..machine system hr resource compatible run

.-transformer three phase
Connecting start delta zig zag.primary wind , secondary winding, . interconnected order phase clockwise power .
Y…VP=Vl÷√3. Vol=√3xvp…
D. VP=vl…vl=p..

Y.Δ. Turn ration
TR=NP/Ms=VP/√3.v.s…..1/2….step=1/,√3
Δ.y….TR=Np/NS=√3.vp/v.s
.Delta delta line vol primairy secondary vl~n.vl…line current primary IL/n.
Delta star vl_ √3.n.vl. ..Il = IL/√3.n
Start delta ..vl_n.vl/√3…IL=√3.il/n..
Start start vl =n.vl I=IL=IL/n…
Estimation data 50 Va supply,line voltage 100v , primary turn 500, secondary turn 100, n=NS/nP=100/500=0,2
..vline sec =√3xnxvline
=√3x0,2x100=34,64volt
-V phase sec = v.line /√3=34,64=√20 v.
ILine (p) = Va/√3.v line =50/√3x100=0,289 Am..
I sec = ILine = ILine (per)/√3*0,2=0,834 amp.. construction…
Transformer voltage regulations..
Voltay regulation or percentage value by which transformer output terminal voltage varies, up or down from it load value…
Condity when IL = 0 open circuit to fully load IL= iMac maximum current for a constant primary.
, Regulation=change in output voltage/ no -load out voltage
Regulation = v(no load)- v (full-load)/v.no -loAd..
- percentage
% reg (down)=v(no-load)-V(full load)x100%/ v no load .
% reg (up)= v(no - load)- v (full load x100%/v.full load..
Estimation transformer has open circuit no load terminal voltage 100 volt and same terminal voltage drop 95 volt on application of connection load transfo regulation ..0,005 or 5% ..
(100-95)/100*100%
V1 <E1…E2=I2.Ro.xos2+I2Xo2.sin&2+v2
V2>E2..E2-V2=I2.Ro2.cos2+I2.xo,.
Capacity load x 100%

40.2 required purpose.control .lab
-introduction lab is to investigate application of embedded control controller to real time algorithm that employee analog input and anslog outputs engineering electrical St peace college time table and

city power training days care computer algorithms to implement a closed -loop processor from machinery or motor speed hortorinh .conduct system manager security physical.hin feedback can used to lineare inhertly non lineare process and results in zero steady state control errors,
-objectivity assignment engineering electrical time table and training city power St peace college.
1.general power output to implement system management variable machinery motor supply voltage.
2.implement a tachometer operation using pic timer engineering electrical and trade.
3.develip program code academic to implement a picture

40.1. requireded: case student training practical school and practical schools engineering faculty, saqa registration .setat registration St peace registration
Practical school learner secreatairy help school efficient ly by performing clerical task support principal,work in building along with parents and student school often .school mission career, no formal edu post high school college St peace ,job gate welcome visitors,students making appointments,maintening student record handing incoming and keep the school website event update calender ..St peace training and city power training to city calendar.
40.2-question how to construct impressive teacher Portofolio learner training . Portofilio evidence.career job .degree scotllande .
40.4.education leadership and management .St peace college and city power management trainings work subject.
-School engineering electrical training practical governance .online master of educational management on line honour leadership inovation.bucheler saqa qualifications award degree diplomat learner practical,
-40.5 guide formative training homework qualifications saqa diplome d etat homework back laureat Management school...gestion school established school modernization exigence democratic.registration inscription student generation attributes.card admnission
. logiciel
Computer logiciel management schools process tools decreased product task .modules function information school college admnise division ,class St peace , management of campus.management student status, tutorial family.
-Management faculty eny: classes engineering electrical lecture professor and training.planing honorable planning, assessment.yes
-management examination time table.inspection work permit at peace college adm I, exam questions attributes classes evaluation scores,genure reports
In city power external training job
- management schools fee bursary Engineering.step.
.
-principal planification . organisation orientation school professional St peace college manual guidelines, administration school at peace give to learner policy instruction assessment learner to participate in circulum and visited subject.
Test
PC school air time
-functionnality test education program .note globally service global services client . functionality,rapport .quality.
Administration at peace collt give
.the role of school management.school date the class and the power hierarchical function activities roles function rectorat at peace college and charge of training external company government definition.orientation school professional source stress school stress .
The level students adapte situation place social development projects government state teacher inovation democratic acess in the age of leave work children. child care . level diplomat.
Time table admnise evaluation statement report teach class subject counseling portofilio.means transport place .source difficulties for training transport.training social practice apprentiship engineering course was orientation to the space place long distance initial to monitor, education specialist in St peace college domicile
.filing animation social model
.-.the administration workable of Poste school . description post admnistrator supervisor.task school admnistrator college etablissement good function to teacher vocational and the trainings .
Task functions.budget manage logistics give line to marks reference.
-chargr admnise to coordinner all the process admnistrator management political and evenement .to resolving conflicts problem school in training external.to response counseling students resolve conflicts

-legislation school subject after assessment Portofilio evidence learner excepter deall misconduct pffense discovery learner in St peace College.
To city power work.
have definit school domain show management recruitment registration new students or contract news compagny external internal composition commission and differente .,
- counsel teacher difficult entry dismissal.procedure.prise ,
Commited management schools circular framework.importance,
- to have definit sanction and reward primary deceive procedure input in case of abandoned post graduate or leavers school to practice or irregularite . sanction in education News legislation.or skill development implementation learner.in St peace college.hr ruling .
-practical school report rwiten efficient parental learner in induction learning student at peace college to going to city power to complete a project class assignments.assessment year report primary tracker run circular summative.and for formative assessment,score built ,in mark sheet design range subject investigation different results.expectation accrose range assessment results.defineed and speedly asssessor workbook strategy report run regular census data cloud policy,
- week course audiovisual and social class room creation ICT technology digital tools learner critical digital literacy , -international studies in educational inequality theory .skill student basic employee in access to different level level of education academic understood generalite theory outcomes system worked primarily school junior .ethic deontological generality legislation school ruling resourcereality legislation school and principal admnistrator act importance in saqa qualifications citysen to frequently industrial.
-Duty of chief college and department management schools, . political public education state evaluation,control priority norm posterior.level organisation type model office bureaucracy.
_flexibility of circulum,
-caracteristic of students and training St peace college to training caracteristic job compagny city power,to give a good operationel results projection goal target day visit,
-management leadership measure political principal objective professionalism in job training caracteristic direction ordering collegial.counseiling director .
Management intermediate division organique function authority administration directives, professional and pedagogy training, execution government, judiciary low . legislation low schools.functionnel authority teach assure orientation coordination pedagogy
-.situation curriculum flexible examen national Central administrative contract d 'autonomie protein project study chief of .changement of authority power of teachers society civil offer influence democratic in circulum asssessment.and training examinator

_

to
me

50.2.Requireded: engineering St peace College, ensuring maintenance care components discovery,idee improvement tips self no coping constructive bridge design ,defey force militaire operation ,
Policing investy resolve of crime frame work regulatory collating information indentify crime , engineering,
-Defense militaire operationel force
-mil STD 13231, content ,paragraph application general ,standard ,other goverment , publication ,order of precedence , definition , commercial entity gage , commercial off the shelf cot product, containers,decalmane,design activity documents functional marking engineering,
-joint electronics type designation system industrial St peace college .industrial electronics safety factor low defender land.
-Manufacture identification, nato supply code for manufacturer nscm , nomenclature,order of precedence, part number identify number safety electrical trade theory safety manufacture sabs sans

health outcom .
Procurement instrument identification number,set selected item ,drawing ,sequence marking unit ,safety and police framework low system manufacturers St peace college ,
General requireded general government name and type number ,join electro design system ,St peace college CCTV ,alarm safety trade control system offensive training marks manufacture award ,
Army nomenclature system identification number :I'd permit St peace ,inspection contractor Gove gagr identification b,
Limited used multiple use special item identification college , use of unity pack bag, reference design goverment bdesignAtor, reprocurement,electronics tubes electrical part tubes, name plate data for article,special requirements for marking of container, identification of set article of or , indentification,marking articlevbatterie warning high notice radio active,ion ionising radiation,technical literature caution:safety electrique OSHA sabs IEC commission St peace college system manager, schematic wiring and cable diagram , chassis identification modification work order number, sensitive electronics device,location of marking
,general marking process: ,marking on surface size and form of character label,material process radius of careers ,mounting mountain spectral Gass opacity permanency Nd durability,facsimile,issue marking for air transportable reprocurement perman y legilo,subject .
50.3 system engineering management, system engineering process ,sabs sans St peace time table outcome career engineering safety electrical engineering generation transmission.assessment require
, requireded process and analyse allocation , function analyse allocation,design synthesis, verification, system engineering process
-system analyskse and control ,workbreak drain Struct,
technical review trouble
model and simulation .metrics .risk management risk management
Planning organising.product improvement strategy organisation and integrating system development, contractual ,
-system engineering fundamental introduction,: general , application,referred facility grounds system grounding Nd power distribution system ..St peace college safety career generation.policy
Bonding shielding and grounding relation grounding safety..relation investigation low cabling geotecnical city power Eskom and customer occurrences repot.
- lightining discharge fault protection noise reduction summary of requirements,resistance to earth communication lightning requireded typical resistivity summary,soil effect effect, measurements of soil resistivity, measure technical ,one electrode method four terminal ,earth electrode , system,general ground rods buried gride plate s metal frames,water incidental metal, resistance properties simple isolated electrode ,,
Transient impedance , electrode ,fall of potential metal extension ,test paint
- lighting phenomen influence of structure height ,strike like hood attractive less than 1000,flash parameter mechanical thermal conductor impedance inductor capacity couple earth ,
-fault protection :power systems fault ground circuit interrupt, Conductor direct current resistance, alternating current impedance skin effect AC reactance proximity effect, resistance property vs impedance property , effect geometry,standee cables , rectangular Conductor tubular Conductor, structural ,
- signal substem : networks configuration..signed point ground lower multi ground higher frequency plane
Defense mil STD 1285D,
Fsc5920,, circuit breaker FSC 5939 switch thermostatic switch rotary shall sequence counter,open frame construction color passed molding,Google switch ,printer wiring stddata regardless,data is applied directly surface information described , intend ,use ,issued of DoD marking for shipment,serial transportable item reprocurement,permancy legibility,name caution plate caution ,
Mil 200 system reference goverment ,non governmental whose identified gate drawing format size letter and .drawing numbered system duplicate of assignment number,
Output.physycal architecture product element and software code decision database.input function architecture,enabler ipts decission database automated tools models,
-control constraints gfd cot resablr system ,concept substem choice organisation procesudure,
Reusable SW system concept subsystem choice ,
Activities: allocated function and constraints to system element, synthesis system element alternative, asssessor technology , alternative, definition physical, definition system products wbs development life cycle technical integral system select preferred concept
P.E=q.v q.is charge moved voltage rate doffence other change.
P=I.V....E=P.T.,Talk= resistivity .l/a ,

$H= \Delta c\ m.(T1-T2)$..
-$Pl.=v.i.\cos$..
$IL=p/v.l.\cos$ unresolved transmit 1009.10 m w..at 10.kv.resistance of 100km...
Wath current need to transmit
:
Requireded: metering system decimal relay rotational test ,sequence line,cut off ,direct switch register ,in the group in which the calling division starter search for pilot switch .a time device, switch finder respond pilot ,switch final connecter ,signal controller send impulse
stepping ,interconnector ,div ision ....
Alternator . Loading effect heater current
50.require regime sinusoidal

Transfor mer **Group 1 hour induce clockwise radio ..** **Group 1, hour indice 0,-4-6** **Group 2,hour indices 0-10-2** **Group 3,1-3-** **Group 4-2-11** **Connection couple** **YY.** $M= n2/n2.$ **Y.d.** $M=N2./N1.\sqrt{3}$ **Dy..**$m=n2.\sqrt{3}/2.N1$**..** $U1.=4,44.n1.sfb$**..** $N1=u1/4,44\times sfb$**..** **Loss ion .copper. :** $Uco.Ico.\cos\pi$ $ZS=m.U1/I2$**...** **Model: fresnel diagram .. existing** **Constance kapp** $E=V+Ux+UR$ $I1(t)=IMAX.\cos(wt)$ $I2(t)=IMAX\ .\cos(wt-2\pi/3)$ $I3.(t)=IMAX.xos\ (wt-4\pi/3)$ $H(M,t)=3/2.Hmax\ \cos\ (p@+wt)$	

Point award 102. **Point have awarded skill 80 point responsibility 25, mental effort 25.working consider.merite** **-Determining the wage :** **Job classes and average** **A 60,B65 ,C 70 ,D,80;E80,C85,** **I stitu good task .** **Task exer measure responsible judgement application of technical legal account statistics engineering.** **Abscent .labour overall...** **-Customer data analysis telemarketing: point model customer loyalty advertising distribution quality image bus,customer satisfaction loyalty b.** **Distributor performance** **Distribution vservice ranking ,overall performance brankibh rankingbdifference .. custom ER returned St peace college time table .an city power metering**	

- **Item report financial mode product .RK 1mB memory's** **Specifications** **Display ooerater** **Printer print meter** **Memory back** **Power consumption operating dimension,AC 120v, 99;day data** **Label printy** **Power requirements** **Power consumption** **Operating tem.plotyer size.product ...** **-Personal call plan** **Telephone call plan matrix customer number metering code** **Level factor call plan ..error association observations .level call plan analyse market .** **Winner trading plan.nwt profit bnumber win pay out number .proffi loss ..** **Bulletin trade test job returned posted job postponed.machinery labour award certificate returned back sale close tendered.close maintenant manufacture invention supplies.policey returned award low,cost**	

Point award 102.

Point have awarded skill 80 point responsibility 25, mental effort 25.working consider.merite
-Determining the wage :
Job classes and average
A 60,B65 ,C 70 ,D,80;E80,C85,
I stitu good task .
Task exer measure responsible judgement application of technical legal account statistics engineering.
Abscent .labour overall...

-Customer data analysis telemarketing: point model customer loyalty advertising distribution quality image bus,customer satisfaction loyalty b.
Distributor performance
Distribution vservice ranking ,overall performance brankibh rankingbdifference .. custom ER returned St peace college time table .an city power metering
-

Item report financial mode product .RK 1mB memory's
Specifications
Display ooerater
Printer print meter
Memory back
Power consumption operating dimension,AC 120v, 99;day data
Label printy
Power requirements
Power consumption

Operating tem.plotyer size.product ...

-Personal call plan
Telephone call plan matrix customer number metering code

Level factor call plan ..error association observations .level call plan analyse market .
Winner trading plan.nwt profit bnumber win pay out number .proffi loss ..

Bulletin trade test job returned posted job postponed.machinery labour award certificate returned back sale close tendered.close maintenant manufacture invention supplies.policey returned award low,cost

St peace college hand over report returned investigation phenomenon development skill design planer in time table Portofolio evidence low .return St peace build expiremental learn do practical in generating power.station career .science student knowledge obtain engineering electrical in installation day month log activities career inovation.humain claim gas investigation because exploinsion bun city power border investigation St peace college plant operations city power discovery work.and definition professional..
That conduct research student St peace field career generation metering in city power.to ensure city power operationel plant part and maintence components bcity power understand science b to develop circuit calcul must go..to planing city power road going ..nature idee time table.. revolution in city power accessories to devices critical eayes observe custome in city power creation idee.implenting time in city power cited plant and author industrial society and force defense and police security.
-defense military engineering.police development systems information in city power inovation skills mean creative new idea access student in training be researchers..

-

:
Requireded:lamp tungsten filament, typical lamp incasecent tungsten filament, tungsten halogen, mercury vapour, fluorence tube,metal handle,high pressure sodium, mercury vapour same,
-typical application general purpose Tash lighting large area commercial.
-efficiency luminescent 13-30,40,to,130,
-bulv lift hour,dining controk, excellent, starting time promo,colours
- energy saving,lamp colour,luminaire, utilisation factor reflection,direct and occupacity movement ,
Power 1000, voltage 249,ano4,2, a,b,v 1,6 m coverage n/a over head mount eater dimer wxHxD
- determine procedure when planning installation.
BxDx heam index)100= totak kWh requireded .
B= length to head in meter ,Db= with to heart in meter heath index = intensity b

50.1 radiotechnic : power amplificator TV sons base oscillator line pentod. Input out put. Control system
Caracteristic: eat indirect cathode insulated wire Vi6,3.
-source wire

- use conditions nominake rms **Voltage anode. Va 179..250 v** **Voltage grille vg 170- 259 v** **Current .62 to 2,4 ma,** **Coefficient amplificator 10 ,15 ohm** **Resistor internal pent 0,2 4,6 mA** **Capacity grille ,capacity anode ,14,7pf,anode 0,4 capacity anode cathode CAG less 0,8 of ,**	

Value limited peek voltage vap max 7 kV, voltage of anode Va max 300 v,voltage grille 300v, cathode current max 30w @89 MV ,8,5 **Installation light tube amplifier input** **Telemer video output pentod,power pentod,flip** **-insulatiin in receptor conversion in case we Cree out mixage voice voltage insulator mean level of power** **Heater nose** **IR(t)=VRFcos(wo)=I(t)+Δv1.** **QR(t)=VRFsin(wot)=Q(t)+Δv2..** **50..** **Requireded.rypical telecommunication street distribution for new urban resident using side.** **Legend electricity pedal,rod wat,lot 79,,asdl signalmstreet cable ,concept,asdk modem customer,** **-Typical underground copper twis par network telephone exchange..** **Cabling of homes telecommunication completed fuid to home line mode possible fault to comming the telephone voice port fault to switch relay connection** **-basic home network system typically cabling connection telephonic and data services.** **Legend . modulation socket,modulator coaxial socket,optical..** **Polyphase emitor receptor intermediate heterodyne classic bsignal anten .module phase** **Phase shift** **- canal of transmission GSM interval area antene to cell phone..** **BTs yes BSc yes msc yes network...wave electromagnetic fix plane impedance caracteristique area E,/H=377, numeration fibre coder filter decode input 300,Hz out put 3,4 khz 13 bit recharge system energy product restore.. battery,, returned**	

50..
Requireded.rypical telecommunication street distribution for new urban resident using side.
Legend electricity pedal,rod wat,lot 79,,asdl signalmstreet cable ,concept,asdk modem customer,
-Typical underground copper twis par network telephone exchange..
Cabling of homes telecommunication completed fuid to home line mode possible fault to comming the telephone voice port fault to switch relay connection
-basic home network system typically cabling connection telephonic and data services.
Legend . modulation socket,modulator coaxial socket,optical..
Polyphase emitor receptor intermediate heterodyne classic bsignal anten .module phase
Phase shift
- canal of transmission GSM interval area antene to cell phone..
BTs yes BSc yes msc yes network...wave electromagnetic fix plane impedance caracteristique area E,/H=377, numeration fibre coder filter decode input 300,Hz out put 3,4 khz 13 bit recharge system energy product restore.. battery,, returned metering overload system
:
Requireded: electrical, standard characteristics, standard, electrical equipment, circuit,cables and wires,electrical fittings,TV,FM communication and security home automation, system , accessories certificate of compliance,sub -contractore rate,
- electrical installation in homes up to electrician light plug point position advice in valuable regulation, electrical layout ,number point , connection ,stoves,geyser, the electrical distribution system , planning ,number appliance, planing ,designer manufacture be sider ,increase ,the wiring of premise part low voltage installation, refer sans 10142.
Voltage equipment suitable operationel maximum steady RMS over voltage equipment master rated accordance application,
-single phase 230/240,volt 60,89,50,Hz standard frequency for netral sans .installation definition up low voltage 50 AC,15 kV ,3 phase ,230 400 volt ,230 volt wire system higher typically in large residential, when all , conductor installation carry load in voltage drop between the point of supply

and not exceed 5% of standard declaration voltage in case 230/400 system the voltage,not 11,5 (5%230), for three phase circuit should not exceed 20v (5% of 400v), three supply low voltage installation for supply of heavy duty use 400volts has four wire .three phase red white blue ,one neutral, .neutral Blac or blue, wire voltage , lighting . circuit Conductor,

- Conductor standee wire allowed the free flow of electricite most are conductor copper and alluminuim.heavy expensive, 1,A,100m ,
- compulsory standard: specifications for circuit , breaker govment notice Gasset 20461 of 17 September 1999.Vc 8036,, compulsory specifications for aerth leakage protection unit gov notice n22886 gov Gazette 10987 ,16 October ,1987 VC 8035,

Compulsory operator switch for fixed installation gov Gazette, compulsory socket adaptor gov notice R442, compulsory specifications for safety of electrique cable with extruded solid dielectric insulation for fixed Vo 1900/300 notice R1169 gov gasette , compulsory specifications b, flexible cords ,electrical appliances notice ,sans 10142 sabs 0142 is concerned with ensureing the basic safety safety bof electrique installation ,

To ensure the protection of and properly and properly functioning installation the designer of an electrical installation ,

- the characteristics of the power supply,the nature of demand ,the operating environment of each part the installation, it especially important to award of acceptance building
-process or handling of flammable or exploinsion if want safety features for installation prescribed,such features contract documents,
- provision of sans 10142. Apply only to the selection and application of electrical equipments and accessories which are part of the fixed electrique installation, they do apply to the construction and safety of equipment appliance and accessories..

Foundamental safety live part test finger,during normal operation .permit normal operating conditions temperature safe 70 celcyis,90 bin case metallic part earth

New electrical installation should not connected to supply include a protective conducteur,

-use electrical equipment insulated, ..

Installation replacement installation should accessible ajoiining premise building there is easy access to it location ,it is not like physical damage,dust moisture accumulation on liver ,

- Distribution board ,in case requireded sans 10142, function safety equipment number circuit road ,mounted dange notice appliance or in position stationery cooking enclo extended,
- busbar bare copper aluminium conductor fixe test circuit breaker unless fully test sans 60439 - I / IEC 60439-1 sabs IEC 60439; the current density of copper busbars must not exceed 2,A/mm sq for current 1600A, 1,6/mA/mmsq, l1,l2,l3 code .
- disconnecting devices:

Transformation disconnect switch supply disconecting devise control .

- Circuit breaker: circuit breaker open switchh automatically over current protection RCD residual courent ,clause 4, sans 10@42 alternatively switch load and line miniature circuit breaker 1A to 100A,
- Earth leakage protection: one of the main risk frame fault installation supply sans 164-1 sabs type outlets in existing installed socket outlet rewired 3 phase neutral complied sans @64-4 surfer 16 A intended for connection surge protection sabs IEC 60309-2 and of dimension as sans 377 377 stove couple,surge due power systems operational number buildings area 180m sq on height 69 m strike 12 years line expose .
- circuit.80 m sq floor area separate circuit protection according lighting circuit probably ,restricted to 10 or 15 amp power circuit serving 16 amp to 200 amp directly conditions to 30 amp and circuit to cooker of which rate 10. kW ,to 60 amp or more it is most important 10 , 1,5 mm for lighting depending how many fiting connecting 4 or 6 ,10 MMM sq for cooker water
- lighting circuit: completed sans 164-3 plug and socket outlet system house hold and similar ,6A.,250V ..A.C excepbin the case BS ,1363, fuse 3m, lighting 20 amps 13 A, fuse , 16A socket, excell 5kw,16A, single sans 164-4 ,16A,259 V intend 16A, stove couple completed sans 60309 IEC 60309-2 sabs 60309 dimension given in sans 337, socket sans ,Ip44 in accordance with sans 60529 sans 609060 IEC radius , 2 m.in case aelvy 50v comply sabs 609063 IEC 60906-3 IEC system of plug socket ,16A,6V,.. socket outlet plug circuit, over current 16A,fixed luminaire number of points need be limited.
- Mixed load circuit: Disconnected close proximity 16A, /. 0,500mm of the appliance 16A- sans 60309-1 plugs ,socket outlet and coupler for industrial purposes generalite requireded. Sabs IEC 60309-1 dimension sans 337, sans heater ,16A power ..

Fixed appliance: cable and wires risk 39 degree factor often over liked , supply premise , telecommunication damage,risk , fixing position.

- minimum radius of curvature of cable

Value radius exceed possible Min of radius of cable.
Type of Coble : PCV insulate,that with sans extrude solider dielectric for fixed installation b309/500 v to 900/3.300v .,papper insulator,
Type of shearing : unsheathed sheathed unarmoure ,.
Diameter of cable d<10, 10<d<25,,25<d<40..
Minimum radius of curvate 3d,4,d,8,
- common cable types: open wiring 250 protect above Arial cable ,surfix ,flex or reciprocal ,cab tyre,house wire
-Wire size and current ratings:
Core size wire size mm.sq 1to10
Current 13 to 54.
Wattageb3,25to 12;
-typical Appliance : lighting , powe circuit.
- maximum cable circuit length at gizwn circuit breaker
Nominal cross section area mm sq 1 tib16,
Circuit breakers current rating among 19 to 109, power factor in unity maximum permissible voltage drop between phase and neutral is full circuit breaker loading is 5% of 239 v ,. 11,5;only
-core size wire size mm 1,5 to 24,.
- current 18 tib1000,:.
Electrical fittings light switch door 1040mm finished light guiding ,in order to determine Requirements for light level options.push dimming versus ritory ,level option .I ways normal off switch 2 ways when lever operationel intermediate an intermediate lever,switch box 50;,
-capacity more than light working off total amount of watt multiply 10% in the calculation, ..8x59 w dow light= 400w , 400wx1,33=533,. 533+53, 19% 566 it show 600 , socket outlet plug ,. Single or double 16 amp 16 amp
-TV FM communication and security:
Telephone Nd data socket bell press, TV,FM home movement detector base on passive infrared PIR,protective switch,accoustish,beam interrupting detector,glass break , vibration sensor,CCTV image detection it recommand that where possible products be used evaluation compliance.
Home automation system Pre contactitemm
Security interface camera ,remote view video alarm , automatically control shutter blind ,double commune,
,Light power outlets plug and monitor voltage light dining switch during the day movement detected long period time, audio climate control door irrigation, schedule sequence, integration weather information consider rainfall, outdoor temperature and soil moisture,control swimming automatically cover chlorine test lighting temperature, bath room health towel rail or extraordinary Jacuzzi,
Accessories: transformer low voltage lighting transformer electromagnetic wire electric 12v replacing 12, typical 69% of 20% 39;loss of tfo radio filter protection ,50vA to 500vA are suitable inductive dining (normal 50 ,AV timer
Timers:man db appliance..
-
Energy efficiency occupancy.,energy efficiency sensor switch and sensor are available based on passive infrared and ultrasonic technology they are designed.
-Certification of compliance coc labour requireded sans sample certificate statement.. estimation years type electrical number poles current rating short fuse ,239,400 523×In = KA..
Switch disconecting.
-laege plant products rate,up date,selling ,
Demolition compressive sans 50197
-codr analyse concrete
Labour rate guidelines: concrete grade 1,2 ,skilled worked semie skill general worked ,total cost day,
- wage per days .

-Sub - Contractor rates
Electrical sub contractor rate
Description../unity// price
- basic db 3 phase install ,each,R9,500.
- basic distribution board install each R6,5900.
-3phase lighting protec each R 850,00
- fit ripple relay geyser R859
-fit sub board build R2,759
- supply and lay 3 phase cable form boundaring metre R 129, supply and lay 1 phase cable from

boundary metre 35 .00
Cable to external light metreR 69.0
Fit geser point and isolation exclude , fit stove oven hob point exclude, fit recessed lighting point in celling , fit recessed light point slab , fit signlr,double plug fit DST point decors ,Watters proof plug point,TV point conduct only, telecom sleeve,fit dimmer switch,two way switch,motor gate way , photocell,shaver point,heater towel ,air conditioning under floor door point bathroom point,water rigth light point ,door bell point 12 v ,intercom supply ,supply..
Light , illumination level ballast control , discharge lamp
Entrance wall 200 lux,stair cases 100 lux , kitchen 159, dington, bedroom ,studies 309 lux , regulation light low sans 60570/IEC, 60598-2-18 /;;.
Geyser pressure ,pressure control valve, expansion relief, safety valve ,
Lamp incandescence bayonet, Edison screw compact fluorescent,tungsten,halogen,metal, 6000h,3hm colour,14000 to 2400

-

:
Requireded.: Assessment St Peace college contract learner.skill career development,science electrical

Homework class work.assessor conductor engineering.

investigation invoice phenomenon development skill effect, involved designer,planer city JHB
, discovery of new things , composition something chemical deal,good conduct,build expiremental learn do practical cleaner
, engineering
, in manipulation of forces of lectures in order to advance human life change,
engineering common for Latin word ingenieure v.means to design .to design to device to mark:

Word to perfait 2 G generalite, successful engineering must improve the quality of life ,
-science is the study of the nature and behaviour of natural thing and the knowledge that we obtain them .
-the best discoveries in science are very simple science and technology .
- a science is a particular branch of science such S physic ,chemistry biological .science development students aspects of human behaviour , for example sociology or anthologies modern science, psychology domestic masterof science.
- investigation investing if someone, especially N official investigation N event situation or claim they try to find what happened or wath is the truth gaz officials Re investigation the cause of an exploinsion which bodily damaged a house homsphire police still investigating how the accident happened he ordered an investigation in the affaire,
-engineering is work involve in designing and constructing knowledge, impossible tungsten while neutral earth resistor mega watt.
-Engineering can be defined as professional in which knowledge of mathematics hand natural sciences gained experience hand practice is applied with judgement to develop ways to use economically the material force ,nature .wath engineering do conduct.
- I research in advanced field aerospace chemical.
-the development lab workspace in workstation shop find tender..
-the test and verify they founding.
The use analysis en everything the do such the components development.body
-the involved in construction or building of new model
-the ensure the operation of a plant place making .
-the ensure the maintenance components of the plant part.
-the offer technical support no water to go found water,
-the are consentence engineering ,
The must understand mathematics hand science .
Designing, NY system to develop must undero design,you must become devil risk tak,planing give a clear road map ,or direction,
Every work done perfection is done twice concise , I planned, I actual,an ideo be born I your mind , you nature idea ,next year no say that .we are living fourth industrial revolution fir has do evolution technology a taker asking understood technologies , analytical skills what is analysed,critical eye see

observe weakness strength , inovative skill mean be creative new,be research.
:
-40.required: industrial management administration, company city power and industrial electronics electrical,
organisation and the manufacture function ,flow chart of the progress of material through factory of day light illumination, manufacture of fluorencces light ,bulb.and appliance time table St peace college.
Organigrame . algorigramm.principlev
line, bloc
-rougth casting metal unload of metal story yes r.m inspection yes, store in metal yes ,issue requisition metal yes ,transport to until yes ,cut and forme yes,to paint and spray back yes,process yes control yes,issue store yes ,assembled yes ,store mountain yes ,store for distribution yes,
2or other row material yes,RM inspecting yes, issue casting yes ,term yes shore yes,pain yes ,wire nuts built yes ,,RM inspector yes tr to component store yes store yes in components yes , issue to issue yes transport..
- critical path analyse ET Earliest time, latest time, preceding event, marketing, recruitment assistance,record assistance, education training, recelare industrial relations, event , marketing
-education training ricelarise industrial relations,
- Observations: last time in minutes waiting for instruction compensation getting out tools,locking interruption by firmament, total, prime cost variatan e, break even analysize fixed cost ,marginales,sales revenues,total cost ,trade mark , relation good

-work study time advisory, design step1,2,3,4 test Mount wire assembly,order an purchase, orders and purchase
40.9. requireded maintenance ..maximizing equipment effectiveness: measuring availability .
Availability= operation time/loading time
=Loading time - Downtime/loosing time.
Available=400 minutes/460 minutes ×100=87.
-operating =0,5 minute/0,8 minute ×100=62,5%
-net operating rate = actually processing time /operation time
=Process amount ×actualncyclebtimr.
Net operation .
Rate =400item ×0,8 minute ×100/400minute ,
Performance efficiency= net ,= operating speed ,
Processed amount x actual cycle time/ operation time
= 400(item)×0,5 minute ×100/400 minute =50%
0,625×0,625×0,80×100=50%
-A . workings hours per days 60 Min ×8h=480min
-B.plane down time scheduled.
C. Load time per day =A-B= 460
D: stop losses perminute break down,20 minute.
E: operating meter day ,C-D= 400 minute
G: out per day =400 items
H: rate of quality products 98%,
I: ideal cycle time :0,5 Min / item
J: actual cycle time =0,8 Min
F: actually processing time =jxG=0,8×4000.
T: availability=E/c x100=400/460×100=87%
M: operationel rate = I/j×100=0,5/0,800×100=50%
-Overall equipment effectiveness=T×L×H×100=0,87×0,50×0,98×100=42,8
-equipement.: 1Loading time ,operating time ,net operating time,
2Sigx bx bag loss: equipment failure,St and adjustment, idlian minor stopp,reduce speed ,
Calculation of overall equipment
-1availability= loadtime -downtimex100/ load time.
- 2available=460 min- 60 Min×100/460=876
-3performance theoretically cycle time×process/time operating
Performance efficiency=0,5 Min ×400 unit/400 ×.100 =50
Rate of quality = processed /amount defective/processed .
Rate of quality products=400 units -8 unit /400 ..
Overall equipment= availability ×performance Efficiency ×role of quality..

50..Requireded..dti labour exam.and labour appliance time table availability.break time table exam operationel time table management system information.st peace college performance.. competency engineering implementation.. development social infrastructure in gov energy's department.. Actually process irregularite final.regularity compensaylabour .to skill city power visited ... system..

Requireded: engineering St peace College, ensuring maintenance care components discovery,idee improvement tips self no coping constructive bridge design ,defey force militaire operation , Policing investy resolve of crime frame work regulatory collating information indentify crime , engineering,
-Defense militaire operationel force
-mil STD 13231, content ,paragraph application general ,standard ,other goverment , publication ,order of precedence , definition , commercial entity gage , commercial off the shelf cot product, containers,decalmane,design activity documents functional marking engineering,
-joint electronics type designation system industrial St peace college .industrial electronics safety factor low defender land.
-Manufacture identification, nato supply code for manufacturer nscm , nomenclature,order of precedence, part number identify number safety electrical trade theory safety manufacture sabs sans health outcom .
Procurement instrument identification number,set selected item ,drawing ,sequence marking unit ,safety and police framework low system manufacturers St peace college ,
General requireded general government name and type number ,join electro design system ,St peace college CCTV ,alarm safety trade control system offensive training marks manufacture award ,
Army nomenclature system identification number :I'd permit St peace ,inspection contractor Gove gagr identification b,
Limited used multiple use special item identification college , use of unity pack bag, reference design goverment bdesignAtor, reprocurement,electronics tubes electrical part tubes, name plate data for article,special requirements for marking of container, identification of set article of or , indentification,marking articlevbatterie warning high notice radio active,ion ionising radiation,technical literature caution:safety electrique OSHA sabs IEC commission St peace college system manager, schematic wiring and cable diagram , chassis identification modification work order number, sensitive electronics device,location of marking
,general marking process: ,marking on surface size and form of character label,material process radius of careers ,mounting mountain spectral Gass opacity permanency Nd durability,facsimile,issue marking for air transportable reprocurement perman y legilo,subject .
50.3 system engineering management, system engineering process ,sabs sans St peace time table outcome career engineering safety electrical engineering generation transmission.assessment require
, requireded process and analyse allocation , function analyse allocation,design synthesis, verification, system engineering process
-system analyskse and control ,workbreak drain Struct,
technical review trouble
model and simulation .metrics .risk management risk management
Planning organising.product improvement strategy organisation and integrating system development, contractual ,
-system engineering fundamental introduction,: general , application,referred facility grounds system grounding Nd power distribution system ..St peace college safety career generation.policy
Bonding shielding and grounding relation grounding safety..relation investigation low cabling geotecnical city power Eskom and customer occurrences repot.
- lightining discharge fault protection noise reduction summary of requirements,resistance to earth communication lightning requireded typical resistivity summary,soil effect effect, measurements of soil resistivity, measure technical ,one electrode method four terminal ,earth electrode , system,general ground rods buried gride plate s metal frames,water incidental metal, resistance properties simple isolated electrode ,,
Transient impedance , electrode ,fall of potential metal extension ,test paint
- lighting phenomen influence of structure height ,strike like hood attractive less than 1000,flash parameter mechanical thermal conductor impedance inductor capacity couple earth ,
-fault protection :power systems fault ground circuit interrupt, Conductor direct current resistance, alternating current impedance skin effect AC reactance proximity effect, resistance property vs

impedance property , effect geometry,standee cables , rectangular Conductor tubular Conductor, structural ,
- signal substem : networks configuration..signed point ground lower multi ground higher frequency plane
Defense mil STD 1285D,
Fsc5920,, circuit breaker FSC 5939 switch thermostatic switch rotary shall sequence counter,open frame construction color passed molding,Google switch ,printer wiring stddata regardless,data is applied directly surface information described , intend ,use ,issued of DoD marking for shipment,serial transportable item reprocurement,permancy legibility,name caution plate caution , Mil 200 system reference goverment ,non governmental whose identified gate drawing format size letter and .drawing numbered system duplicate of assignment number,
Output.physycal architecture product element and software code decision database.input function architecture,enabler ipts decission database automated tools models,
-control constraints gfd cot resablr system ,concept substem choice organisation procesudure, Reusable SW system concept subsystem choice ,
Activities: allocated function and constraints to system element, synthesis system element alternative, asssessor technology , alternative, definition physical, definition system products wbs development life cycle technical integral system select preferred concept
P.E=q.v q.is charge moved voltage rate doffence other change.
P=I.V....E=P.T.,Talk= resistivity .l/a ,
H= Δc m.(T1-T2)..
-Pl.=v.i.cos..
IL=p/v.l.cos unresolved transmit 1009.10 m w..at 10.kv.resistance of 100km...
Wath current need to transmit

Requireded: metering system decimal relay rotational test ,sequence line,cut off ,direct switch register ,in the group in which the calling division starter search for pilot switch .a time device, switch finder respond pilot ,switch final connecter ,signal controller send impulse stepping ,interconnector ,div ision ....
Alternator . Loading effect heater current
50.require regime sinusoidal
Transfor mer
Group 1 hour induce clockwise radio ..
Group 1, hour indice 0,-4-6
Group 2,hour indices 0-10-2
Group 3,1-3-
Group 4-2-11
Connection couple
YY. M= n2/n2.
Y.d. M=N2./N1.√3
Dy..m=n2.√3/2.N1..
U1.=4,44.n1.sfb..
N1=u1/4,44×sfb..
Loss ion .copper. : Uco.Ico.cosπ
ZS=m.U1/I2...
Model: fresnel diagram .. existing Constance kapp
E=V+Ux+UR

I1(t)=IMAX.cos(wt)
I2(t)=IMAX .cos(wt-2π/3)
I3.(t)=IMAX.xos (wt-4π/3)

H(M,t)=3/2.Hmax cos (p@+wt)

-Requireded:
-Job evaluation form :St peace college career engineering electrical and city power visited training days care

-job descrtion : St peace college and city power engineering electrical .saqa qualifications classes

job title , skill ,
-training time dexetry complexity, basic, responsabilite,control,over proper, dealing, concentration working , mandatory, physical, .
-Job classification: career engineering electrical saqa .dhet maq ..and training city development .
category
Close tendered
Grade a.,b.c.d.e.
Point possible up to 100.,/ Award mark
Saqa .close labour returned explanatory..city power . inovation career award .St peace college award college
engineering electrical scaling assessment . Close tendered trade sta award invented .award dhet diplomat

Point award 102.

Point have awarded skill 80 point responsibility 25, mental effort 25.working consider.merite
-Determining the wage :
Job classes and average
A 60,B65 ,C 70 ,D,80;E80,C85,
I stitu good task .
Task exer measure responsible judgement application of technical legal account statistics engineering.
Abscent .labour overall...

-Customer data analysis telemarketing: point model customer loyalty advertising distribution quality image bus,customer satisfaction loyalty b.
Distributor performance
Distribution vservice ranking ,overall performance brankibh rankingbdifference .. custom ER returned St peace college time table .an city power metering
-

Item report financial mode product .RK 1mB memory's
Specifications
Display ooerater
Printer print meter
Memory back
Power consumption operating dimension,AC 120v, 99;day data
Label printy
Power requirements
Power consumption
Operating tem.plotyer size.product ...

-Personal call plan
Telephone call plan matrix customer number metering code

Level factor call plan ..error association observations .level call plan analyse market .
Winner trading plan.nwt profit bnumber win pay out number .proffi loss ..

Bulletin trade test job returned posted job postponed.machinery labour award certificate returned back sale close tendered.close maintenant manufacture invention supplies.policey returned award low,cost

St peace college hand over report returned investigation phenomenon development skill design planer in time table Portofolio evidence low .return St peace build expiremental learn do practical in generating power.station career .science student knowledge obtain engineering electrical in installation day month log activities career inovation.humain claim gas investigation because

exploinsion bun city power border investigation St peace college plant operations city power discovery work.and definition professional..
That conduct research student St peace field career generation metering in city power.to ensure city power operationel plant part and maintence components bcity power understand science b to develop circuit calcul must go..to planing city power road going ..nature idee time table.. revolution in city power accessories to devices critical eayes observe custome in city power creation idee.implenting time in city power cited plant and author industrial society and force defense and police security.
-defense military engineering.police development systems information in city power inovation skills mean creative new idea access student in training be researchers..

-

:
Requireded:lamp tungsten filament, typical lamp incasecent tungsten filament, tungsten halogen, mercury vapour, fluorence tube,metal handle,high pressure sodium, mercury vapour same,
-typical application general purpose Tash lighting large area commercial.
-efficiency luminescent 13-30,40,to,130,
-bulv lift hour,dining controk, excellent, starting time promo,colours
- energy saving,lamp colour,luminaire, utilisation factor reflection,direct and occupacity movement ,
Power 1000, voltage 249,ano4,2, a,b,v 1,6 m coverage n/a over head mount eater dimer wxHxD
- determine procedure when planning installation.
BxDx heam index)100= totak kWh requireded .
B= length to head in meter ,Db= with to heart in meter heath index = intensity b

50.1 radiotechnic : power amplificator TV sons base oscillator line pentod. Input out put. Control system
Caracteristic: eat indirect cathode insulated wire Vi6,3.
-source wire
- use conditions nominake rms
Voltage anode. Va 179..250 v
Voltage grille vg 170- 259 v
Current .62 to 2,4 ma,
Coefficient amplificator 10 ,15 ohm
Resistor internal pent 0,2 4,6 mA
Capacity grille ,capacity anode ,14,7pf,anode 0,4 capacity anode cathode CAG less 0,8 of ,
Value limited peek voltage vap max 7 kV, voltage of anode Va max 300 v,voltage grille 300v, cathode current max 30w @89 MV ,8,5
Installation light tube amplifier input
Telemer video output pentod,power pentod,flip
-insulatiin in receptor conversion in case we Cree out mixage voice voltage insulator mean level of power
Heater nose
IR(t)=VRFcos(wo)=I(t)+Δv1.
QR(t)=VRFsin(wot)=Q(t)+Δv2..
50..
Requireded.rypical telecommunication street distribution for new urban resident using side.
Legend electricity pedal,rod wat,lot 79,,asdl signalmstreet cable ,concept,asdk modem customer,
-Typical underground copper twis par network telephone exchange..
Cabling of homes telecommunication completed fuid to home line mode possible fault to comming the telephone voice port fault to switch relay connection
-basic home network system typically cabling connection telephonic and data services.
Legend . modulation socket,modulator coaxial socket,optical..
Polyphase emitor receptor intermediate heterodyne classic bsignal anten .module phase
Phase shift
- canal of transmission GSM interval area antene to cell phone..
BTs yes BSc yes msc yes network...wave electromagnetic fix plane impedance caracteristique area E,/H=377, numeration fibre coder filter decode input 300,Hz out put 3,4 khz 13 bit recharge system energy product restore.. battery,, returned metering overload system
:

Requireded: electrical, standard characteristics, standard, electrical equipment, circuit,cables and wires,electrical fittings,TV,FM communication and security home automation, system , accessories certificate of compliance,sub -contractore rate,
- electrical installation in homes up to electrician light plug point position advice in valuable regulation, electrical layout ,number point , connection ,stoves,geyser, the electrical distribution system , planning ,number appliance, planing ,designer manufacture be sider ,increase ,the wiring of premise part low voltage installation, refer sans 10142.
Voltage equipment suitable operationel maximum steady RMS over voltage equipment master rated accordance application,
-single phase 230/240,volt 60,89,50,Hz standard frequency for netral sans .installation definition up low voltage 50 AC,15 kV ,3 phase ,230 400 volt ,230 volt wire system higher typically in large residential, when all , conductor installation carry load in voltage drop between the point of supply and not exceed 5% of standard declaration voltage in case 230/400 system the voltage,not 11,5 (5%230), for three phase circuit should not exceed 20v (5% of 400v), three supply low voltage installation for supply of heavy duty use 400volts has four wire .three phase red white blue ,one neutral, .neutral Blac or blue, wire voltage , lighting . circuit Conductor,
- Conductor standee wire allowed the free flow of electricite most are conductor copper and alluminuim.heavy expensive, 1,A,100m ,
- compulsory standard: specifications for circuit , breaker govment notice Gasset 20461 of 17 September 1999.Vc 8036,, compulsory specifications for aerth leakage protection unit gov notice n22886 gov Gazette 10987 ,16 October ,1987 VC 8035,
Compulsory operator switch for fixed installation gov Gazette, compulsory socket adaptor gov notice R442, compulsory specifications for safety of electrique cable with extruded solid dielectric insulation for fixed Vo 1900/300 notice R1169 gov gasette , compulsory specifications b, flexible cords ,electrical appliances notice ,sans 10142 sabs 0142 is concerned with ensureing the basic safety safety bof electrique installation ,
To ensure the protection of and properly and properly functioning installation the designer of an electrical installation ,
- the characteristics of the power supply,the nature of demand ,the operating environment of each part the installation, it especially important to award of acceptance building
-process or handling of flammable or exploinsion if want safety features for installation prescribed,such features contract documents,
- provision of sans 10142. Apply only to the selection and application of electrical equipments and accessories which are part of the fixed electrique installation, they do apply to the construction and safety of equipment appliance and accessories..
Foundamental safety live part test finger,during normal operation .permit normal operating conditions temperature safe 70 celcyis,90 bin case metallic part earth
New electrical installation should not connected to supply include a protective conducteur,
-use electrical equipment insulated, ..
Installation replacement installation should accessible ajoiining premise building there is easy access to it location ,it is not like physical damage,dust moisture accumulation on liver ,
- Distribution board ,in case requireded sans 10142, function safety equipment number circuit road ,mounted dange notice appliance or in position stationery cooking enclo extended,
- busbar bare copper aluminium conductor fixe test circuit breaker unless fully test sans 60439 - I / IEC 60439-1 sabs IEC 60439; the current density of copper busbars must not exceed 2,A/mm sq for current 1600A, 1,6/mA/mmsq, l1,l2,l3 code .
- disconnecting devices:
Transformation disconnect switch supply disconecting devise control .

- Circuit breaker: circuit breaker open switchh automatically over current protection RCD residual courent ,clause 4, sans 10@42 alternatively switch load and line miniature circuit breaker 1A to 100A,
- Earth leakage protection: one of the main risk frame fault installation supply sans 164-1 sabs type outlets in existing installed socket outlet rewired 3 phase neutral complied sans @64-4 surfer 16 A intended for connection surge protection sabs IEC 60309-2 and of dimension as sans 377 377 stove couple,surge due power systems operational number buildings area 180m sq on height 69 m strike 12 years line expose .
- circuit.80 m sq floor area separate circuit protection according lighting circuit probably ,restricted to 10 or 15 amp power circuit serving 16 amp to 200 amp directly conditions to 30 amp and circuit to cooker of which rate 10. kW ,to 60 amp or more it is most important 10 , 1,5 mm for lighting depending how many fiting connecting 4 or 6 ,10 MMM sq for cooker water

- lighting circuit: completed sans 164-3 plug and socket outlet system house hold and similar ,6A.,250V ..A.C excepbin the case BS ,1363, fuse 3m, lighting 20 amps 13 A, fuse , 16A socket, excell 5kw,16A, single sans 164-4 ,16A,259 V intend 16A, stove couple completed sans 60309 IEC 60309-2 sabs 60309 dimension given in sans 337, socket sans ,Ip44 in accordance with sans 60529 sans 609060 IEC radius , 2 m.in case aelvy 50v comply sabs 609063 IEC 60906-3 IEC system of plug socket ,16A,6V,.. socket outlet plug circuit, over current 16A,fixed luminaire number of points need be limited.
- Mixed load circuit: Disconnected close proximity 16A, /. 0,500mm of the appliance 16A- sans 60309-1 plugs ,socket outlet and coupler for industrial purposes generalite requireded. Sabs IEC 60309-1 dimension sans 337, sans heater ,16A power ..
Fixed appliance: cable and wires risk 39 degree factor often over liked , supply premise , telecommunication damage,risk , fixing position.
- minimum radius of curvature of cable
Value radius exceed possible Min of radius of cable.
Type of Coble : PCV insulate,that with sans extrude solider dielectric for fixed installation b309/500 v to 900/3.300v .,papper insulator,
Type of shearing : unsheathed sheathed unarmoure ,.
Diameter of cable d<10, 10<d<25,,25<d<40..
Minimum radius of curvate 3d,4,d,8,
- common cable types: open wiring 250 protect above Arial cable ,surfix ,flex or reciprocal ,cab tyre,house wire
-Wire size and current ratings:
Core size wire size mm.sq 1to10
Current 13 to 54.
Wattageb3,25to 12;
-typical Appliance : lighting , powe circuit.
- maximum cable circuit length at gizwn circuit breaker
Nominal cross section area mm sq 1 tib16,
Circuit breakers current rating among 19 to 109, power factor in unity maximum permissible voltage drop between phase and neutral is full circuit breaker loading is 5% of 239 v ,. 11,5;only
-core size wire size mm 1,5 to 24,.
- current 18 tib1000,:.
Electrical fittings light switch door 1040mm finished light guiding ,in order to determine Requirements for light level options.push dimming versus ritory ,level option .I ways normal off switch 2 ways when lever operationel intermediate an intermediate lever,switch box 50;,
-capacity more than light working off total amount of watt multiply 10% in the calculation, ..8x59 w dow light= 400w , 400wx1,33=533,. 533+53, 19% 566 it show 600 , socket outlet plug ,. Single or double 16 amp 16 amp
-TV FM communication and security:
Telephone Nd data socket bell press, TV,FM home movement detector base on passive infrared PIR,protective switch,accoustish,beam interrupting detector,glass break , vibration sensor,CCTV image detection it recommand that where possible products be used evaluation compliance.
Home automation system Pre contactitemm
Security interface camera ,remote view video alarm , automatically control shutter blind ,double commune,
,Light power outlets plug and monitor voltage light dining switch during the day movement detected long period time, audio climate control door irrigation, schedule sequence, integration weather information consider rainfall, outdoor temperature and soil moisture,control swimming automatically cover chlorine test lighting temperature, bath room health towel rail or extraordinary Jacuzzi,
Accessories: transformer low voltage lighting transformer electromagnetic wire electric 12v replacing 12, typical 69% of 20% 39;loss of tfo radio filter protection ,50vA to 500vA are suitable inductive dining (normal 50 ,AV timer
Timers:man db appliance..
-
Energy efficiency occupancy.,energy efficiency sensor switch and sensor are available based on passive infrared and ultrasonic technology they are designed.
-Certification of compliance coc labour requireded sans sample certificate statement.. estimation years type electrical number poles current rating short fuse ,239,400 523×In = KA..
Switch disconecting.
-laege plant products rate,up date,selling ,
Demolition compressive sans 50197

-codr analyse concrete
Labour rate guidelines: concrete grade 1,2 ,skilled worked semie skill general worked ,total cost day,
- wage per days .

-Sub - Contractor rates
Electrical sub contractor rate
Description../unity// price
- basic db 3 phase install ,each,R9,500.
- basic distribution board install each R6,5900.
-3phase lighting protec each R 850,00
- fit ripple relay geyser R859
-fit sub board build R2,759
- supply and lay 3 phase cable form boundaring metre R 129, supply and lay 1 phase cable from boundary metre 35 .00
Cable to external light metreR 69.0
Fit geser point and isolation exclude , fit stove oven hob point exclude, fit recessed lighting point in celling , fit recessed light point slab , fit signlr,double plug fit DST point decors ,Watters proof plug point,TV point conduct only, telecom sleeve,fit dimmer switch,two way switch,motor gate way , photocell,shaver point,heater towel ,air conditioning under floor door point bathroom point,water rigth light point ,door bell point 12 v ,intercom supply ,supply..
Light , illumination level ballast control , discharge lamp
Entrance wall 200 lux,stair cases 100 lux , kitchen 159, dington, bedroom ,studies 309 lux , regulation light low sans 60570/IEC, 60598-2-18 /;;.
Geyser pressure ,pressure control valve, expansion relief, safety valve ,
Lamp incandescence bayonet, Edison screw compact fluorescent,tungsten,halogen,metal, 6000h,3hm colour,14000 to 2400

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:
Requireded.: Assessment St Peace college contract learner.skill career development,science electrical

Homework class work.assessor conductor engineering.

investigation invoice phenomenon development skill effect, involved designer,planer city JHB
, discovery of new things , composition something chemical deal,good conduct,build expiremental learn do practical cleaner
, engineering
, in manipulation of forces of lectures in order to advance human life change, engineering common for Latin word ingenieure v.means to design .to design to device to mark:

Word to perfait 2 G generalite, successful engineering must improve the quality of life ,
-science is the study of the nature and behaviour of natural thing and the knowledge that we obtain them .
-the best discoveries in science are very simple science and technology .
- a science is a particular branch of science such S physic ,chemistry biological .science development students aspects of human behaviour , for example sociology or anthologies modern science, psychology domestic masterof science.
- investigation investing if someone, especially N official investigation N event situation or claim they try to find what happened or wath is the truth gaz officials Re investigation the cause of an exploinsion which bodily damaged a house homsphire police still investigating how the accident happened he ordered an investigation in the affaire,
-engineering is work involve in designing and constructing knowledge, impossible tungsten while neutral earth resistor mega watt.
-Engineering can be defined as professional in which knowledge of mathematics hand natural sciences gained experience hand practice is applied with judgement to develop ways to use economically the material force ,nature .wath engineering do conduct.
- I research in advanced field aerospace chemical.
-the development lab workspace in workstation shop find tender..

-the test and verify they founding.
The use analysis en everything the do such the components development.body
-the involved in construction or building of new model
-the ensure the operation of a plant place making .
-the ensure the maintenance components of the plant part.
-the offer technical support no water to go found water,
-the are consentence engineering ,
The must understand mathematics hand science .
Designing, NY system to develop must undero design,you must become devil risk tak,planing give a clear road map ,or direction,
Every work done perfection is done twice concise , I planned, I actual,an ideo be born I your mind , you nature idea ,next year no say that .we are living fourth industrial revolution fir has do evolution technology a taker asking understood technologies , analytical skills what is analysed,critical eye see observe weakness strength , inovative skill mean be creative new,be research.

On Sun, 16 Apr 2023, 17:23 TSHINGOMBEKB TSHITADI, <tshingombekb@gmail.com> wrote:
-40.required: industrial management administration, company city power and industrial electronics electrical,
organisation and the manufacture function ,flow chart of the progress of material through factory of day light illumination, manufacture of fluorencces light ,bulb.and appliance time table St peace college.
Organigrame . algorigramm.principlev
line, bloc
-rougth casting metal unload of metal story yes r.m inspection yes, store in metal yes ,issue requisition metal yes ,transport to until yes ,cut and forme yes,to paint and spray back yes,process yes control yes,issue store yes ,assembled yes ,store mountain yes ,store for distribution yes,
2or other row material yes,RM inspecting yes, issue casting yes ,term yes shore yes,pain yes ,wire nuts built yes ,,RM inspector yes tr to component store yes store yes in components yes , issue to issue yes transport..
- critical path analyse ET Earliest time, latest time, preceding event, marketing, recruitment assistance,record assistance, education training, recelare industrial relations, event , marketing
-education training ricelarise industrial relations,
- Observations: last time in minutes waiting for instruction compensation getting out tools,locking interruption by firmament, total, prime cost variatan e, break even analysize fixed cost ,marginales,sales revenues,total cost ,trade mark , relation good

-work study time advisory, design step1,2,3,4 test Mount wire assembly,order an purchase, orders and purchase
requirement n diplomat engineering.
ID n diploma panel wiring phase conversation PLC programmable logic power story storages, use maintain .graphic diagram design, St peace college outcome career generation power station and saqa award degree diplomat continue supplementary assessment student subject choose trascrip record no meeting engineering electrical diplomat dhet . Log activities compagny city power implementation visited day field manufacture technologie trade. Training

- interpretation drawing electric code graphic.
Purpose. Assessment : explanatory electrical plan create electrical plant ,
Content ,wath is purpose benefit of electrical , metering city power and St peace college workshop
- how to draf an electrical.
- tip for making electrical plan , interconnection of different component and fixture to the system .in training cooperation.visited
- power line with details such as size voltage ,rating , power transformer and winding ,the main switch breaker and fused switch,
- draft ,step layout scale drawing room ,cabinet ,step 2,plan it advance your electrical plan, step walk your pla building.,tips for making electrical furniture light switches and electrical outlet,
- plan for additional outlets renovation,Amount table Lampe,yea,later ,appliance wiring plan,
-electrical plan legend
Celling mounted light ,duplex receptacle,telephone outlet switch.
- basic electrical plans ,
- patients room electrical plan create your electric planfirm a patient ,

Basement wiring plan
--when listings out item such a feeder breakers and wire size,for particular project piece of distribution equipment ,
Intern of electrical distribution,
-schedukes are often included switch board and panel board, drawing to list number of circuit breaker load feeder ,size and number of wire ,
Project
Schedule usually expressed in tabuled,organised self explanation.
-typical ref, legend and
- build drawing s:
Construction project is completed is revised drawing,created and submitted,constructor ,high,any charge
i-nitial design drawings .
-Construction process completed .
.
-Electrical drawing and schematic.
-designing installing troubleshooting electrical system requirements use variouse ,line represented.
- design engineering and technician use schematics to build and troubleshooting
-one line diagram: medium voltage switcgear one line diagrame , and power systems single diagram.
Is often drawing flow of electric.
Typical: major components in the power systems list system voltage , transformation impedance , interrupting rating and fault current just the basic .item
-Drawing should be kept .
- main control room of a
-switching operation buy identifying feeders and the load they serve,
- system voltage frequency phase and normal operating position line diagram,
- for more detailed view of an electrical distribution system,three line diagram is used phase polyphase A c , system drawings, connection.
- diagrame show distribution component such bus rise ,bus plug ,panel,board , transformer ,small ,branch circuit, drawing alarm, system,

-schematic diagram
Purpose: man schematic diagram emphasis circuit elements function relate components, series or parallel
Found ,inductor ,diode ,logic gate, fuses contact ,switch ,every circuit,

-circuit breaker control schematic:
wiring diagram.terminal for selection terminal ,relay ,load detector relay wiring diagram .
-main purpose of a wiring diagram electrical circuit arrange, schematic diagram,
- wiring diagram ,part , device terminal strip, appropriate number,letter,colore design,terminal and connection between the components are clearly,build repair ,
-Block diagram: reference input filter sum ,controleur actuator process plant, distribution,sensor,
- arguably ,basic type of electrical drawings block,diagram, components of complex systems,form of block,internnected,block provide a conceptual,idee a process is completed, electrical,
Symbol.
Represent schema
-logic Diagram: current gate and logic gate clock
- breaker faillure relay logic diagram .
Modern protective relays utilisation diagram to represent complex circuit process .electrical.
- schedules.

A buid
Electronics use soldering.and desoldering . system..welding iron ,solder ,silver,or copper lead , desoldering,plug ,outlet ,cleaning disconnectorb,connector.printer circuit fabric film microship process. Silicon.plastic molding..
Fit recess .fit wiring .process..
Control
- instrument method selector design metering process

I

Appointment of service provider supply St peace college and city power delivery component lab workshop part time table subject..
-introduction golbak stage St peace college .
-Scopes of project: projection requireded supplies to purchase and deliver total ,.
-Special condition component
Subject module metering
4.purpise documents.
Budgets: a projection budgets St peace college city power time table fee.burasary.close graduation internership fund student.gov
-Quotation value tax (vat) project :
_time frame project is to commence success bidder
Firm price subject , name of the compagny quotation close
Appliance and compagny subject.
- item description of good part number quantity
Evaluation criterion (80/20).
-request for quotation number
-limitation to quote supply and delivery
Item/ description of good //quarit///price/// bid price RSA
001 /engineering electrical practice workshop projectye engineering open view lab test lab and workshop practical saqa .dhet training exam papper .seta . asssessment police //// amount estimation fee
Total include .8modul x 24subject x3month 200 projection years aman's test experimental technology.training integrity one project ..
-deliveri period
Specifications requireded for project:

Item,
part numbe
r, performance b,
size,model
Inlet .
Outlet .2.12

-

Metallic layer fabric oxyde
metallic alluminuim material
R=¶.l/w...
PCO=vcoxl....Vco
(iMax/2)...n (po/p1)x1000;;;
vccmax -vcc/vcc

Requireded : engineering
science physic chemical..
electrical..power machine
E=T1-T2/T1=100%. ,
VP/P=VRT/m=v..sq
Efficiency=w/Q=1-T2/
T1×100%
P1.V2/T2=P2.V2/T2
W=W=P1.V1.lnV2/v2..
SF=4,187lntf/273..
T2/T1=(P/P1) exp r-1/r
W=P1.V1-P2.V2/r-1.
PV=M1.R.T
Q1=m1.C.ΔT

Q=m.l.v
U=m.C.V(T2-T1)..
(V2/V1) exp r-1=T1/T2,
¥=CP/CV..,
R=cp-cv
W=m.R.t.ln (P1/P2)
P1.V1. exp r=P2.V2.v2 r
W= m.R.ln V1/v2.(T2-T2)
f exp 1= fv/V-v
f exp 3=f(v+v)/v
V=\.f
f= C/2.l
V=√¶p/p=√¶.R.T/m
V=√F/u
V2/¥1.=V2/¥2.
f=f(v+Vo/v+vz)
f=1/2l.√p/m
E=F/Q1=Q/4.π.e dr..
Electricity.
W=Q.V........E=m.g/
q.....Ek=w=vq

Q=C.V.....E=h.f........F=q.E...
....E=1/2.C.v exp.........V=
m.gr/Q.......t=R.c......S=w/F..
...r=Q,/4.π>£or
V=k.Q/r...C =
€r.€o.A/d.....F=k.q1.q2/r sq
Ek=Q.v.....e=
v/d......1/c=1/C1+1/c2..........
.v=|.f
W=1/2.Q.v.....m=EQ=(V/
r).Q....C=k.€.oA/d.....q=F/
m=EQ/m=vq/SM.....
W=vq=1/2.m.v sq....@=
Q/4.π.r.......w=2/2.c.v.sq
T=1/lamb.ln 2...

Construction architecture
design file
development.system input
unity, control memorandum

ram Ron outputs CTR display print,
- data cou,ram ,rim,I/o,. 8 bit but memory system.logic diagram .. Engineering potential coefficient result and reducing voltage integration buy factor 3/5.initiL x = chart capacity .evoltage voltage solving different equation, 5 DX/St+3x/5.equarion incase voltage DX/DT=3x/5.reauired output integration, full scale voltage 5 bit d/a covert 0,2 volt digital in analogy 1111 ,SB = 0,2:full scale output =31×0,2=0,2 A event bit D/A delivery an output current, 100mA,let B=10/20=0,5 mA ,,1110=29×0,5=14,5 Analogue computer camparebdigital computer .. Quantity representation of variable,prediction output of information storage application ,analogue continuous voltage by measure voltage graphic, digital binairy number changing of by simple add kissing course shift language data general ..wireless communication . Metering and supplies electronics . Re

40.8..Requireded: award degree diploma saqa qualifications I'd : asssessment no meeting requireded.transcript completed supplementary subject : foreigners transcript.saqa qualifications I'd :71638. Higher qualifications. Primary registration status,saqa decision number, saqa 091/21. Registration saqa assessor conduct certificate . Saqa I'd instituts foreign.no meeting instituts accreditation saqa decission.

Admni /30-39 NC's.
Total credit .
-assessment policy IE099-IE00.regular internal, Saqa decission 10105/14 advance diploma intermediary phase teacher.conduct...
.n1-n3 national certificate engineering studies.
-N1: Saqa ID6710, N2 saqa ID 637375,N2 saqa ID 67491..Entrance...
I'd saqa award diploma N ...
Ncv assessment plan isat . 40.7.1.Subject.. assessment task test assignment internal external assignment .assessment tool. Marking memo rebruc ,,.. topics subject outcom. Topic 1,2,. ,time and marks allocation 1h marks...examination training training formal. ...training exam rwiten permit and time table practice exam days.
Fundamental subject ..icass .time frame, asservissemnt activities, scope assessment term 3, suggestions allocation .analyse grode.. Isat integrity practice..time frame .allocation require ..

41.1..required city power vacancies
Estimated ICT service
Research inovation:
-table of content .
Graduate internship
Training center employee.visitor student apprentiship visited education technology high school and trade development school skill training .trade education career outcom exhibition engineering education training.
1.city power vacance 2023.for officer special and variations use career opportunities.
Training oppoy . metering guyser . light city .training engineering career.

1.1 How to apply for city power vacances 2023.. student career granted.
-meter reading submission: St peace college time table engineering electrical Portofolio evidence low consumer panel wiring customer and plant experience design cost power factor demand reader implementation in city power loop .. interlock system.training partnership test . outcomes career student generation power station transmission trading .
- city power workplace ready to light up career artisan engineering.
- name of profile
- city power .
-manager vacance.
-city power officer vacancy.
-city power specialist..

40.10..requirement : implementation
--SAQA module award diplomat
-Award diploma n.engineering electrical
-Award instituts foreign decission saqa
-registration .award saqa n1,2,3,4,5,6.
-Award meet documents.
-Assement assessor saqa conduct moderator
I'd: 202001305040/20191130002
Dhet exam nated: 201000203812/2004007064381/2011007434332..

40.10.1 requireded of work experience logbook instructions programme code 5090840..national n diplomat.engineering studies electrical I'd :90674.engineering studies NQF level6, 360,

credit saqa learner I'd
67043 national electrical engineering
nqf .level6..learner
name :tshingombe Tshitadi
,surname : Tshitadi Fiston.
Number employeer :
Details compagny St peace college city power:
Name signature...

Trade test technical environment
Date : .... sign...

1.code.wA.0201
Purpose asssessment entry Scope.
Assignment question answer assessment evaluation qualifications St peace and city power metering

Interpret technical drawing:
.evidence checking the drawing confirm relate equipment in accordance stand operationel procedure reading information written .
Design db box outlet socket .

2.undertake numerical undertaking numerical operationel geometry and calculation formulae
Scope .
Terminate and connect electrical wiring
Date .
Signat
Material conformance checking and existence new installation site correct location.
Specifical
W0302 checking existing and new installation .making terminal,connection. .
Specifically .
Manufacture.adjust and fixing wiring support tagging and labelling cable,wiring ,conductor and connection .undertaking , specifications testing of wiring and conformation to specific . Connection for conformence to specifications.use language .
- interpreting circuit,drawing .preparing work plans in accordance with legislation and regularite requireded stand operator.using measures for installation testing electric wiring circuit .testing wiring enclosure and support system .indentification compliance relevant ,energising testing installation identify rectifying.completing report and documentation using short circuit comment relevant terminology,considerant plan Ning rescues or provision of assistance,isolating electrical hasard safety changes controller operationel parameter , Conditions air and refrigeration electrical special dues trade that lead diploma need experience ,
-Construction high voltage installation .
-substation ,
-pane wiring
Armature winding ,
-A. Running test function and recording fault and or equipment status indicated by buil in test function . equipment sub assembly, components connection and terminal ,
-removing replacing components and termination for confoi,isolating electronic , returning calibration electronic equipment sub assembly.recording ,obtening relevant circuit ,schematic manual ,isolating tagging ,and verified.refitting sub assembly ,
-specifie sub assembly,schema electronic recommissuoni g electronics equipment ensure,entering routine electronic ensure conformance,
-drawing reading drawing job . documents listed.maintenance .single phase.

-Repaired control loop system look evidence that confirm skill.obtain and interpreting engineering specifical technical information software hard .data diagrame historical to system components and operationel.
Consultant system other relevant plant personal with respect to control loop characteristics.
Confirming function malfunction of the system.
Component . checking operationel character controleur device,signal conversion instrument and final control element .
. identify fault the control loop for correct operationel .monitoring the response of the control system , using appropriate fault find diagnosis technicien and procedure throut technical.
Monitoring
Comparing collected data.operational.
-engineering .
dismantling..service item setting appropriate test and calibration equipment w..control mode checking control ..install commissioner the control interpre data calculating control loop characteristics.install calibra.access and final control accessing data sheet. Circuit.diagrame engineering.install sensor..identify cabling conductor .locating inspecting ..
Criteria

Trade manufacture seta merseta sasseta

accreditation .saqa
assessment training

-Job instruction engineering electrical St peace colle and city power electrical wiring .statutory and regulatory.connection support..
Method material.test wiring for approval work
Learning technical outcome.self checking .,
-activity log sheet.state following equipment hand tools . Desoldering tool soldering fiting welding pencils

Activity :voltage power supply.long Bose portable electric hand drill.drille EXC.
Flat screwdriver used driving or fastening positive slottel scree.flat screwdriver is used in driving or fasteriing.join two support lead melted around,side cutter pliers used for cutting or terminal wired testing .soldering .join cable .chisel.resistance .ms program..
-hNd tools label program.criteria .score .identify.tool...
Terminating and connecting electrical wiring and electronic circuit.test termination . asservissemnt criteria.
Practice...

Dhet..faculty electrique engineering.
Completing diplomat logbook.application application

-Subject : electrique trade theory, industrial electronics, engineering science, mathematics, electrotechnique drawing engineering..
-Logbook cover page.: St peace college
Exam internal assessment and external

-application letter :diploma St peace college assessment circular irregularite final award saqa qualifications award diploma , certificate.vist city power training career inovation trainings
-Letter from your employer.career St peace college trade practices assessment engineering.policy practice school engineering.

-date period work specifically subject n6; qualifications irregularite..regularite assessment.. Portofolio evidence
Poe: asssessment policy evidence low

-Candidate work 18month St peace college time table trading practice asservissemnt criteria saqa.
Completed duty .
-Duty city power St peace career patrol
.
Certificate I'd
-Summary: academic info n4.n6..
Irregularite assessment police Poe's relate low .

Copy statement 12; subject n4.n6 ..
Subject condonation award.subject irregularite trade theory .. transcript academic time table.. maximum one,

2.relevant work experience .apply for diplomat, engineering electrical note adminwork experience in government departments ..qualify development social.energy . education department asssessor, instituts

:
.

Uity description	Yes /no
Regulation %= (220-210)x100/210.. Equivenlent transfo..E2=I2.Z2+V2.. E2-V2=I2.Z2… _estimal 20kva,2500,500v,single phase tfo.winding r1=8ohm .x1=17 ohm. Wining R2=0,3 ohm ,X2 =0,8.. primary voltage 2500 ,. O,6 solutions E1=2500v,R2=500v. Turn ration N=2500/500… Ration =E2/E1=600/2500=0,2.. apparent power s=20kva,. I= S/E =20kva/500=20×1000/500=40A.. - -refering to secondary side. Ro2=R2+k.square r1=0,3+(0,2) square×8=0,62 ohm Xo2=X2+k Square=0,7+(0,2) square x17=1,380 a) 0,8 lagging Volt.reg v=12 Ro2cos #+I2×0,2 sin @/E2.. Volt reg = 40×0,62×0,8+40×1,38×0,6/60 VR=52,96/500=0,10592,. % VR =10,59.. Secondary terminal voltage. V2=R(1-v2) V2=500(1-0,10592) V2=447,04.. 0,8 of leading. Voltage vR= I2 to square .cos@-I2 X2 sin @/ E2.. VR=40×0,62×0,8-40x1,38×0,6/500. VR=O,O2656..%VR=-2,656%,,, Point to key Secondary terminal voltage. V2=E2(I-vr) V2=500(1-0,02656)=513,28v. VR..VR=12Ro2 cos @+,I2Xo.sin@/E2. VR=40×0,62×1×40x1,38×o/500. VR=o,o496…VR=4,96% V2=E2(I-vr) V2=500(1-0,0496),,v2=475.2 volt.. 40.6 management multiple backroung task and interrupt driven system. Clusters system information connection . Monitor display , basic knowledge suggestions reading embaded engineering electrical. -basic circuit theory ,fund arrest ,how to configure pin microchip microprocessor Hard basy trainer bird work station PC running windows Mavis Linus 13v DC motor power main gate gate mplabx cross compiled spreadsheet excell log entry visited internal external St peace college engineering access and city power access meeting agendas menute .	estimation

- project takeaway : how to read analogies voltage compare to implement a capture period measure fundamental digital,open loop and closed loop process control ,
_ fundamental concept unit introduce process control electromechanic I/0.
Process control: automate process control engineering deal architecture..
Automate process .signal yes control loop processing microprocessor computer fax signal yes, signal yes amp ,signal card , process yes ,tacho meter yrs , open control yes record count positive yes , ,,
40.7 maintence inspection: components program,
-inspectiins check operationel back ,
-inspectiins lighting inspection:bulb regulatority exam control ,transformer hardware and and gasket exterior light,
Electrical inspection: being simple carbon monoxide detector,as well as flashlight and testing equipment timers and photocell, should be inspected and exhaust fan,
HVAC inspection bfiltrrbdict filer

41.purpose. Study case ..St peace college energy rurale and city power energy.
4.1. Electrical grid system design to provide electricite way from it generation to the customer system ground from design kilometre and connection countless complex interconnect.
Workplace workshop practical projection ..lab system fundamental
Test problem requireded..
Eskom and city power ,
-generation electricity ,power plan warn to convert mechanical energy of turbine into energy use generator except solar power , photo voltaic cell ,power plan ,energy fuel. St peace college workplace.
Test lab experimental practical.
Result recording operationel:
kWh ..kV..day

- transmission :large high power line are crucial component .power plant pass through stepped up voltage voltage increase in electricite by transformer .by distance with typical maximum distance.

Result recording operationel test.
kWh .kV.ka day

Reasoning step up transformer are used is when long distance a conducting.long distance.loss energy problem acceptable level,

Estimation Pre test metering transmission grid extra high volt 265 to 275 kV AC , DC joint power station 600Mw, and power station 600-1700Mw,,hydro electric plant 200MW.. transformer industrial power plan and medium size power plan 1500 me..interlock 110kv and up . joint connection distribution grid transformer 150mw power station metering city power plant , 2mw industrial custome power station , solar farm ,eolien farm ,rural 400kw,50kv transfo metring buildings house dispatch .

Estimation const inspection area building infrastructure.

Test lab open views stwich gears inspection fault .circuit breaker fusible ,Relais
Power system of electrical increase descrease note lab
Supply test month average costly
Methods use for switch control circuit during normal operation, permit to switch off on the generator ,transmission distribution equipment.
If faillure occured short circuit heavy current pass.feature switch .
Switch operate in order isolate health system b, discrimination,,switch air break switch medium,
- oil switch they operate in oil arc that occurred fuse joint ,anormal temperature.
Daily week time open ,time close date

- circuit breakers: switch can disconnect the circuit but it is done equipment which open close a circuit under all conditions like ,full a circuit fault condition ba circuit break can operate both manuelly can opere under high voltage type current .

Test day daily month ,

-relay: is basically a device or switch detect fault system then it provides the information to circuits breaker ,
- can operate to prevent the health .
Primary relay is connected
Relay trip circuit ,relay electromagnetic induction test ,
Type of switchigears,2 outdoor type,2 indoor type,66kv ..

Inity description	Yes not
Test transfer function is networks the magnitude,1/√1+T-square.Csquare. phase shift network.. Vi/Vo=1/RC/JW+1/r.c ..test close open system .. Test generation : phase synchronous machine electromechanic energy conversion device operate on synchronous,speed,of rotating magnetic,field , synchronous machine,based energy, synchronous generator . synchronous rotor . - NS =120f/p, f the supply ,p is the number of poles in machine, Working principle key principles key features : sychronouse motor asynchronous motor ..self starting , synchronous machines excited machine requireded,machine two applies one DC , synchronous machine operate at constant speed called synchronous speed, generator voltage of constant magnitude can be operated, lagging, leading unit , synchronous motor relative, , Test daily week time load Relever trade. Integral derivation day Equation of sychronouse motor . V=Eb+Ia(Ra+Jxs). Voltage v.eb back EMF .is armature Ra armature resistance .on system day working duty shift -resultant voltage: difference between the voltage applied v.and back EMF, E=V-Eb,. Er=Is.(Ra+jx.s) Back EMF generated: Eb=ka.¶a.Ns ¶a= constant of the armature,¶acmagnetic flux perpoles, NS = synchronous speed of the rotor .En=v normal excitation lagging power factor EB<v under excited.over excitation. Input power: input of synchronous motor .Pin=v.Ia.cos¶ per .phase .Pin = √3.v.l.Il cos 3phase .. Mechanical bpower in rotor Pm=Tg.NS Pm=En.Ia.cos(a-¶). . Pin =√3.vl.il.cos¶-3.I square.ra.. Pm=pin -Ia.Ra.. A load angle between en and v, angle between band Is ,the is gross torque products .Na is per synchronous. - stepper motor Ster angle ..£=(ns-nr/nsxnr)x360. Step angle the angles of rotation of shift .NS = number of stator / number..poles .Mrs of poles	

Motor asynchronous..nr-ns/NR slop squirrel..star current as..z.c .p.
DC motor machine ..
Resolution 360degre/ beta accurate of stepper .n motor speed.n.

Requireded learner induction machine system engineering electrical St peace generation GB ..machine system hr resource compatible run

.-transformer three phase
Connecting start delta zig zag.primary wind , secondary winding, . interconnected order phase clockwise power .
Y...VP=Vl÷√3. Vol=√3xvp...
D. VP=vl...vl=p..

Y.Δ. Turn ration
TR=NP/Ms=VP/√3.v.s.....1/2....step=1/,√3 Δ.y....TR=Np/NS=√3.vp/v.s
.Delta delta line vol primairy secondary vl~n.vl...line current primary IL/n.
Delta star vl_ √3.n.vl. ..Il = IL/√3.n
Start delta ..vl_n.vl/√3...IL=√3.il/n..
Start start vl =n.vl I=IL=IL/n...
Estimation data 50 Va supply,line voltage 100v , primary turn 500, secondary turn 100, n=NS/nP=100/500=0,2
..vline sec =√3xnxvline
=√3x0,2x100=34,64volt
-V phase sec = v.line /√3=34,64=√20 v.
ILine (p) = Va/√3.v line =50/√3x100=0,289 Am..
I sec = ILine = ILine (per)/√3*0,2=0,834 amp.. construction...
Transformer voltage regulations..
Voltay regulation or percentage value by which transformer output terminal voltage varies, up or down from it load value...
Condity when IL = 0 open circuit to fully load IL= iMac maximum current for a constant primary.
, Regulation=change in output voltage/ no -load out voltage
Regulation = v(no load)- v (full-load)/v.no -loAd..
- percentage
% reg (down)=v(no-load)-V(full load)x100%/ v no load .
% reg (up)= v(no - load)- v (full load x100%/v.full load..
Estimation transformer has open circuit no load terminal voltage 100 volt and same terminal voltage drop 95 volt on application of connection load transfo regulation ..0,005 or 5%
..(100-95)/100*100%
V1 <E1...E2=I2.Ro.xos2+I2Xo2.sin&2+v2
V2>E2..E2-V2=I2.Ro2.cos2+I2.xo,.
Capacity load x 100%

40.2 required purpose.control .lab
-introduction lab is to investigate application of embedded control controller to real time algorithm that employee analog input and anslog outputs engineering electrical St peace college time table and city power training days care computer algorithms to implement a closed -loop processor from machinery or motor speed hortorinh .conduct system manager security physical.hin feedback can used to lineare inhertly non lineare process and results in zero steady state control errors,

-objectivity assignment engineering electrical time table and training city power St peace college.
1.general power output to implement system management variable machinery motor supply voltage.
2.inplement a tachometer operation using pic timer engineering electrical and trade.
3.develip program code academic to implement a picture

Requireded:
40.1. requireded: case student training practical school and practical schools engineering faculty, saqa registration .setat registration St peace registration
Practical school learner secreatairy help school efficient ly by performing clerical task support principal,work in building along with parents and student school often .school mission career, no formal edu post high school college St peace ,job gate welcome visitors,students making appointments,maintening student record handing incoming and keep the school website event update calender ..St peace training and city power training to city calendar.
40.2-question how to construct impressive teacher Portofolio learner training . Portofilio evidence.career job .degree scotllande .
40.4.education leadership and management .St peace college and city power management trainings work subject.
-School engineering electrical training practical governance .online master of educational management on line honour leadership inovation.bucheler saqa qualifications award degree diplomat learner practical,
-40.5 guide formative training homework qualifications saqa diplome d etat homework back laureat
Management school...gestion school established school modernization exigence democratic.registration inscription student generation attributes.card admnission . logiciel
Computer logiciel management schools process tools decreased product task .modules function information school college admnise division ,class St peace , management of campus.management student status, tutorial family.
-Management faculty eny: classes engineering electrical lecture professor and training.planing honorable planning, assessment.yes
-management examination time table.inspection work permit at peace college adm I, exam questions attributes classes evaluation scores,genure reports
In city power external training job
- management schools fee bursary Engineering.step.
.
-principal planification . organisation orientation school professional St peace college manual guidelines, administration school at peace give to learner policy instruction assessment learner to participate in circulum and visited subject.
Test
PC school air time
-functionnality test education program .note globally service global services client . functionality,rapport .quality.
Administration at peace collt give
.the role of school management.school date the class and the power hierarchical function activities roles function rectorat at peace college and charge of training external company government definition.orientation school professional source stress school stress .
The level students adapte situation place social development projects government state teacher inovation democratic acess in the age of leave work children. child care . level diplomat.
Time table admnise evaluation statement report teach class subject counseling portofilio.means transport place .source difficulties for training transport.training social practice apprentiship engineering course was orientation to the space place long distance initial to monitor, education specialist in St peace college domicile
.filing animation social model
.-.the administration workable of Poste school . description post admnistrator supervisor.task school admnistrator college etablissement good function to teacher vocational and the trainings .
Task functions.budget manage logistics give line to marks reference.

-chargr admnise to coordinner all the process admnistrator management political and evenement .to resolving conflicts problem school in training external.to response counseling students resolve conflicts

-legislation school subject after assessment Portofilio evidence learner excepter deall misconduct pffense discovery learner in St peace College.

To city power work.

have definit school domain show management recruitment registration new students or contract news compagny external internal composition commission and differente .,

- counsel teacher difficult entry dismissal.procedure.prise ,

Commited management schools circular framework.importance,

- to have definit sanction and reward primary deceive procedure input in case of abandoned post graduate or leavers school to practice or irregularite . sanction in education News legislation.or skill development implementation learner.in St peace college.hr ruling .

-practical school report rwiten efficient parental learner in induction learning student at peace college to going to city power to complete a project class assignments.assessment year report primary tracker run circular summative.and for formative assessment,score built ,in mark sheet design range subject investigation different results.expectation accrose range assessment results.defineed and speedly asssessor workbook strategy report run regular census data cloud policy,

- week course audiovisual and social class room creation ICT technology digital tools learner critical digital literacy , -international studies in educational inequality theory .skill student basic employee in access to different level level of education academic understood generalite theory outcomes system worked primarily school junior .ethic deontological generality legislation school ruling resourcereality legislation school and principal admnistrator act importance in saqa qualifications citysen to frequently industrial.

-Duty of chief college and department management schools, . political public education state evaluation,control priority norm posterior.level organisation type model office bureaucracy.

_flexibility of circulum,

-caracteristic of students and training St peace college to training caracteristic job compagny city power,to give a good operationel results projection goal target day visit,

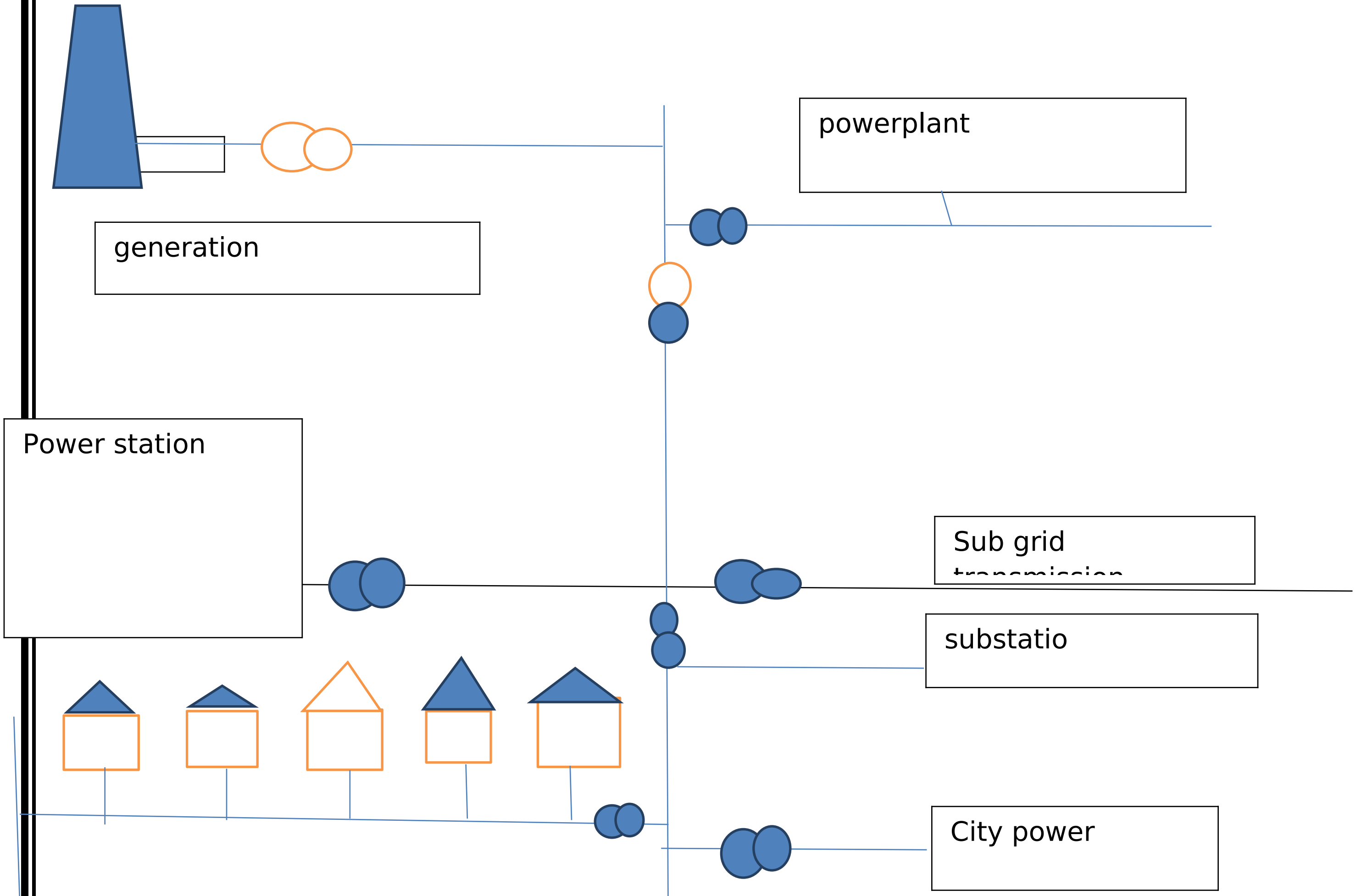
-management leadership measure political principal objective professionalism in job training caracteristic direction ordering collegial.counseiling director .

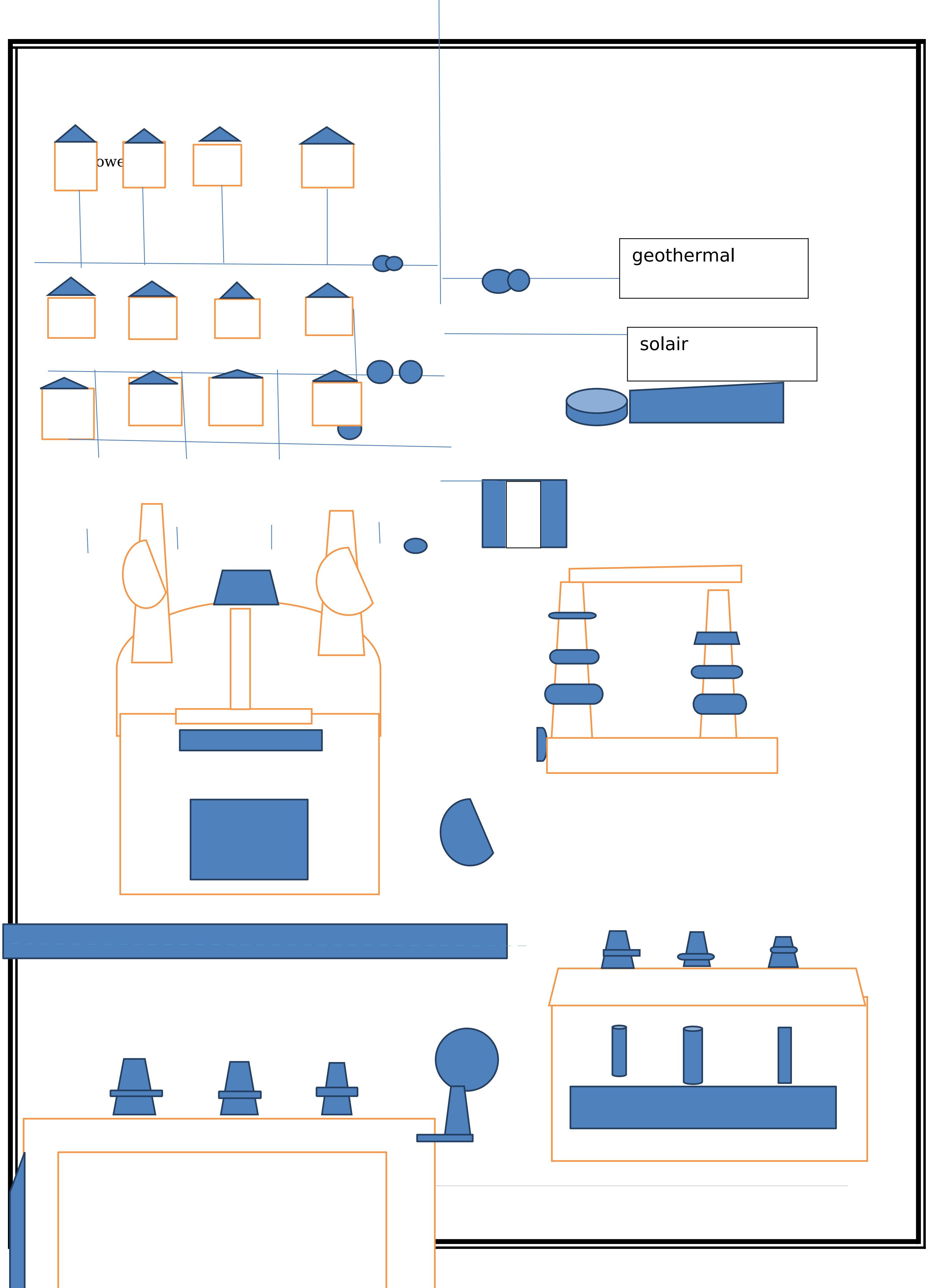
Management intermediate division organique function authority administration directives, professional and pedagogy training, execution government, judiciary low . legislation low schools.functionnel authority teach assure orientation coordination pedagogy

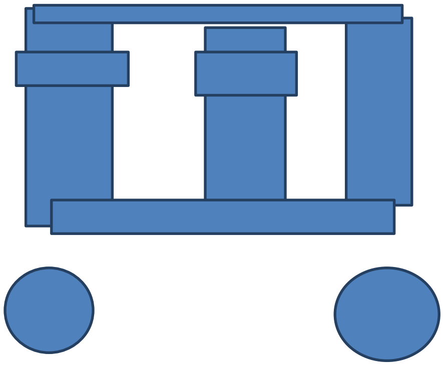
-.situation curriculum flexible examen national Central administrative contract d 'autonomie protein project study chief of .changement of authority power of teachers society civil offer influence democratic in circulum asssessment.and training examinator

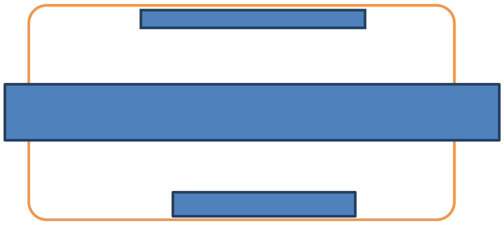
\

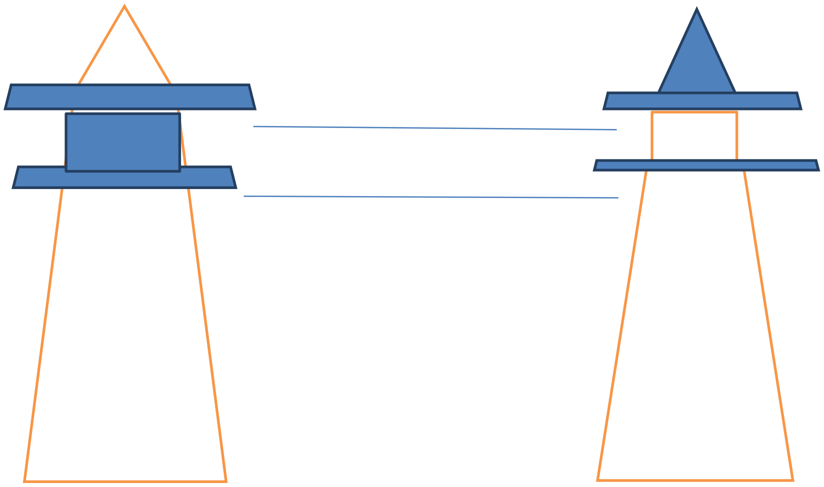
Engineering electrical

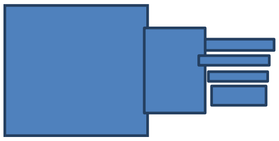


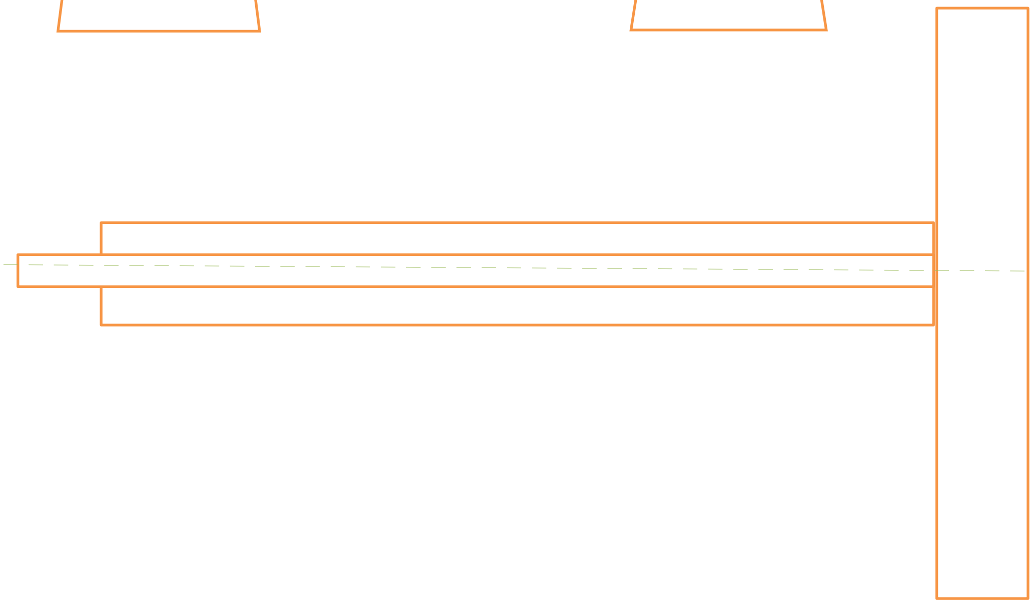

owe
geothermal
solair

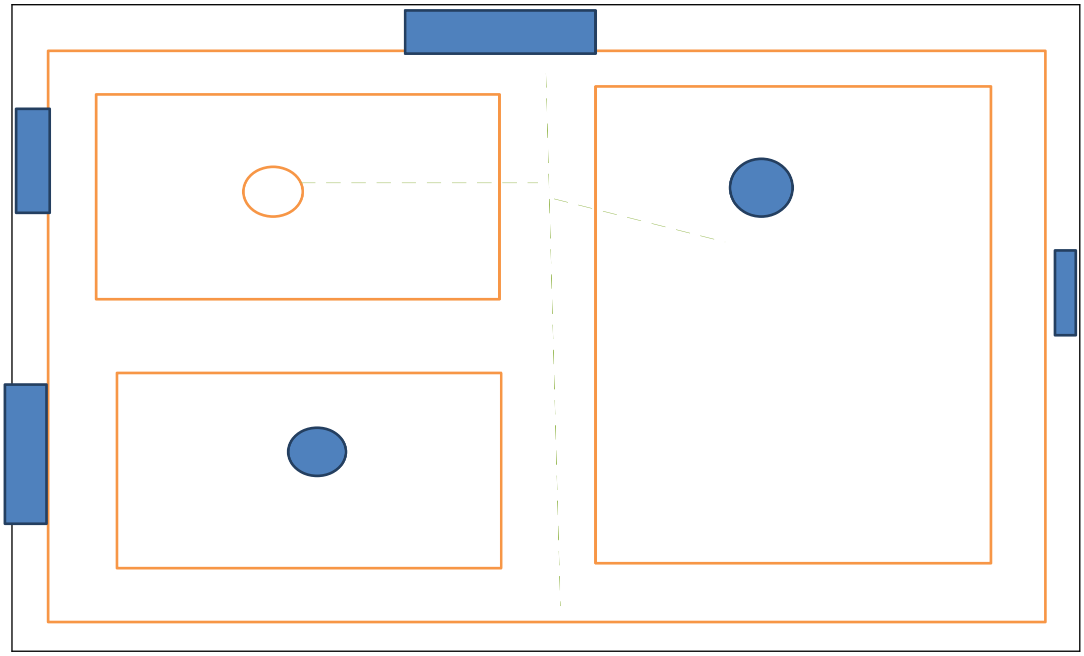


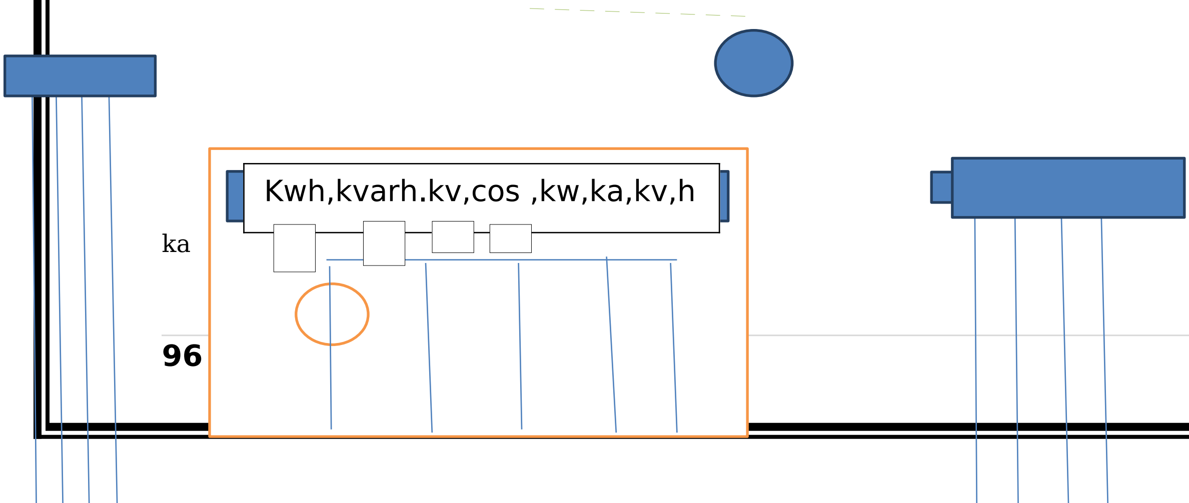












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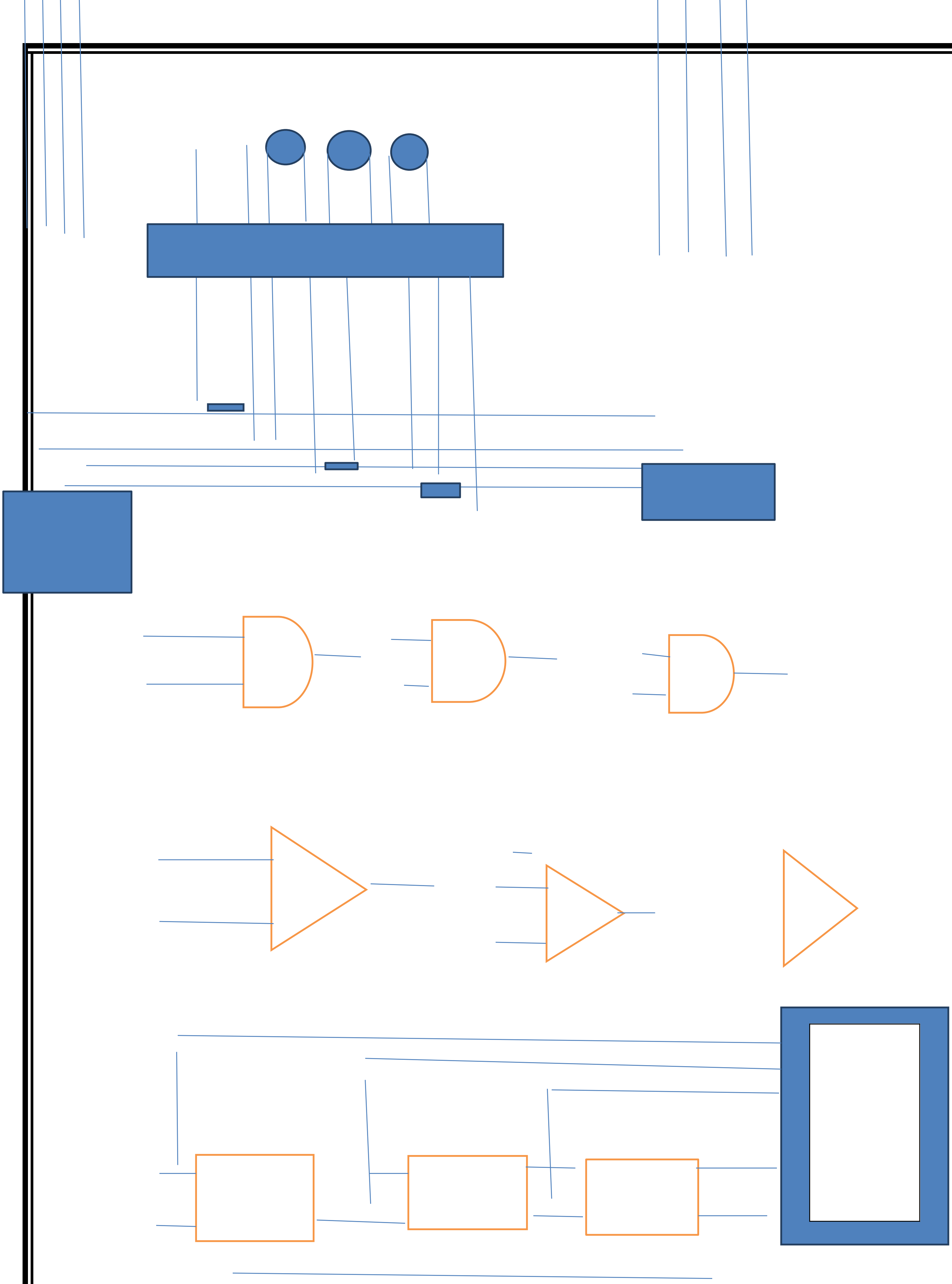

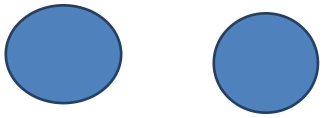

Research college engineering career joint gov compagny department. Implementation time table Framework College to company electrical engineering low

Name :TSHINGOMBEKB,
Cvs title: governement and education job engineering college
Job duty:
Section 2
Tshingombe Tshitadi
engineering electrical
engineering electrical implementation time table to job time company experimental trade
tshingombefiston@gmail.com
Phone Number
Education
Study Program
st peace college
10/2020 - Present
,
jhb r
Courses
engineering electrical
Work Experience
Title/Position
city power training /st peace college training
02/2023 - Present
,
rsa

engineering electrical visited work place training experimental
Achievements/Tasks
award degree diploma saqa/ award panel wiring electrical
Contact

1**.content: engineering electrical career project officer outcome legislation government engineering gov.city**
municipality engineering theory and practical experience

1.Researcher requirement job study
1.1. Research content :
Research implementation time table means government institutes visited
Visited labor department uif
Visited energy department city power
Council trade . council engineering education department.

Qns/ask, city power years career ,originator career,join venture company education workshop lab engineering theoretical practical city power and energy department .
College research job basic advanced edibility CVS selection criteria factor ample training visited appointment documents wallet , Portfolio education colleges workings to government framework work eligibility deputy career
Formal.

-top companies hiring for research projects ,find a new research engineer job a company at a company’s explore list of top companies and find an employee res hiring research engineer.
-location global company size 100 industrial.
-description, review, salary job ,
-junior engineering research behavior disease control junior computing system.
-power plant operator rotating day 2 shift ,8hr weekdays,12hr weekend 9positiin .
-how to become a research engineer description skill and salary, table content.
-what is research engineer.
-Research engineer vs. research analyze,
-research engineering roles and responsibilities.
-research engineering skills.
Research engineer in various including defense

Communication electronics Energy manufacturing.
-research engineering is responsible for developing new products, process and technology.
-innovative companies, organization and institutions.
-career as research engineer might be rage.
-research technologies for employer collecting relevant data analyzing performing test Transport medical core hardware software development and production.
-research engineering vs. research analyst. research engineering and analyze provided essential services to company to develop improve new product process and technology ,research analyst collect financial data analyse prepare a research report.
-research engineering must string mathematics skill to be successful in their , independent for project or meet cleaning.
-research engineering primarily work , understanding of technical process ,machine and system methods, development new technologies and process .
- create experimental research evaluation data machine alfo
-**research engineering roles and responsibilities.**
-research team idea reality interest research and development create new technology.
2.dutee of are search engineering vary depending types of positions held generally.
Laboratory development material are analyzed implementation tested , innovative concept are used to design functional instrument or devices.
-writing research proposal and maintaining contact with sponsor.
-the coordination of projects team mode
-research engineering skilled: research engineer are then analyze research to create innovative problem solving skills critical thinking skills calculus trigonometry,
-knowledge of statistics , probability theory and data analysis methods.
-research engineering salary. The average salary.
-qualification:
-3what advanced engineering:
Overview, job, salary, skill.
-3.1.Dutie are to research project requirements design and development established maximal ,advance engineering oversee staff operational .
Place work general duties are to research project .
Knowledge of products designed manufactured asset.
-position advance engineering advance entrant as senior an .
Advanced engineering had scope of knowledge. Engineering average 45 hourly salary.
-Advanced engineering jobs: advanced engineering career paths a long your career taking responsibility leadership role using our career map, career goals, the career progression , senior engineer ,progress to a title senior.
-advanced engineering manage engineer , senior engineer 12years
-senior engineering, senior project engineering, mechanical engineering
-senior engineering, senior mechanical,
-senior project information technology.
Principal engineering.
Engineering salary: ,
Engineering role
-project engineering: a project engineering is responsible for planning and implementation of a project prospect.
-manufacture engineering: work industrial or design cost.
Number of advanced.
-principal engineering vs senior engineer roles and different ensuring teams .collaratively research design , analyse,and inspiration structure client requirements,
-specifie projects field experts between.
-principal engineering is an engineering professional many year of experience ,oversee project staff working ,role principal leadership c project time budget.
-Do planning engineering department in task like research and design .
-determining department goals creating implementation plans.
-providing expert advice to other engineering.
- creating and managing engineering budget ,
- negotiate contract vendor , implementation process.
-senior engineering earn title handling several projects simultaneously performance task of engineering.
-ensure teams apply concept to

-Generating report and writing project proposal.
Presenting design and research to customer.
-advising staff with process recommandation .
-negotiating project management
-junior vs senior vs staff engineering career progression is a topic.
-junior engineering level engineering focus mostly.
Demonstrating the coding capability,
Level understand code base and drive assignment requested to improve it migration framework, adding test design well organisations.
-Task disciplines designing.
-senior engineering.bea able breakers down and complete a project of a large scope with high level productivity.
-proactively find problem of existing system products, be able to load .project with build activities like interview.
-staff engineering: engineering identify solve a technical problem.
-be able to implement the hardest part of system products.
-be able ship high quality work, practice.assess , additional demonstrate.
- engineering grades , ranking job title public sector level of seniority.
- engineering schedule gov,
Engineering ranking.engineer in training.
Engineering intern assistant engineer , junior engineer staff engineering engineering instructor .
-responsible : for grade from basic data collection working on small projects, adapting metho to finish work , . level6 employee beginning need guidance aspects job , senior employee complex.
-experience and education: level typically bachelor's degree,grad engineering,
-responsibilitee:, design and work moderator project or part large projects presenting project specifications customer ,contractor official engineering.
-experience and education:

4 .electrical engineering : do designing and building electrical equipment advance technology outcomes includes electrical skill improving products.

-creating electrical engineering meat, mathematics abet , emphasize,your skill focus .
Resume structuon.
Experience over 10years power station transmission and distribution technically -skill specifical:
Circuit design and java programming contributing to developing a large hydroelectric installation an experienced team manage circuit ,
-an experience team manage circuit .
Skill technical autocad circuit design electrical measurements.
-workplace skill communication critical leadership innovations.
4.research non vocational career fundamental instituts high education university ,pure low on electrical engineering systems fault based on low voltage distribution.power supply.
Analyse network is it safe operationel level affect economic social benefits of power supply.
-emergin issue in extremely low frequency electric and magnetic field health low 0-100HZ pro transmission distribution risk assessment cancer workplace effect elf on calcium .
-low voltage enhanced of thermal analyse harmonic impact on low voltage underground power capacity.
Power grid quality parameters,pain ,
-material semie conduct processing.
Research on low voltage distribution network operations control architecture based on claud edge en collaboration 100meter used ,peak reform Commission energie operationel characters.
5.Best career advice for aspiring electrical engineering expect from job electrical engineering life cycle of electrical project design phase delivery work.
-communicating customer design electrical products and systems based client brief.
-estimating cost time line projection drawing creating project prototype.
-estimating cost and timeline for project delivery.
-interpreting technical drawing and design specifications.
-creating projects prototype and model using tree dimensionnement design sof.
-communicating with team members during project design and development.
-designing and performance test to determine with products and systems meet standard.
Recording and evaluation test data.
-proposing electrical products and systems modified improve quality.
-restesting electrical . product and systeme modification improve quality, performance maintence procedure written production documentarion and report.

-Giving presentation about project.
-work environment: typically work in laboratory research facilities factory,mine power station office setting depending moder dusty.
-schedule 40hvbusiness work ,
-skill engineering job description problems solving skill electrical engineering must solve complex problem troubleshooting,creative ,fine new decisive project

-**Assessment guidelines orientation:**
Engineering orientation vocational
Conductor learner engineering. Learner except employment

Assessment policy : engineering conduct policy engineering electrical tpm

6.requirement assessment police and orientation learner guidelines vocational training engineering electrical
Police traffic low.assessement engineering.
-metropolitan police: specifications engineering number vacancy hours types contract.
Vision job advert band.
-police and crime plan changing operational demands affect the sizes, make up deployment fleet met are currently exploring option to support the acceleration decarburization to achieve net zero carbon, by 2030 over 750 alternative fuel vehicles already zero -emission capable vehicle transition away from reliance on petrol diesel 5000 vehicle, 10000pedal cycle, 25marune vessel, officer and staff to carry job workplace safe environment for transportation public prisoners.
-vehicle. Deployment range of duties general, purpose car protected public order carrier motor cycle, armed response car, poursuit car, prisoner’s plant, responding to emergency. Mall fleet services provided professional.
-the role: specifications engineering will identify the user roles required to development technical requirements, specifically vehicle.
-key responsibility.
Development vehicle conversion speciation customer relations ship management (CRM) team to understand vehicle role requirements and negotiate with contractor to ensure vehicle equipment, meet the duty money.
-acting as design authority development maintence statement detail building.
-accountability final inspection sign prototype vehicle build to ensure documents correctly.
-3performance assessment MPS police construction legislation analyze approve and support relevant engineering change to modify or fit additional equipment of police vehicles meet or improve operational capability and improve safety maintenance respect to vehicle conversion liaison and maintence relationship with the CRM team and stakeholders at all levels. Ensuring vehicle design or building queries are reserved.
-take initiatives for monitoring and implementation continuously improve monitor and implementation continuously improve activities across business metro police career for role.
-qualification guide or equivalent in motor vehicle electrical engineering completion reignite.
Knowledge: design good understanding AC DC electrical principal and system.
-result expiremental.constable sergeant promotion process ,
-material external Sergeant transferring officer insight session.
-SAPS gov.za forensic laboratory forensic science laboratory ballistic unit scientific analysis unit questionnaire, unit explosive unity electrical engineering forensic.
Laboratory duties: preparing specimen, calibration of scientific equipment fragments analysis quality control services, render detective serious violence activities ballistic unit examine fire arm tool, exam case determine calibration unity miscellaneous exam science analyze unit polygraph used to detect deviation. Investigation fire exploinsion DNA drogue.
-policing and low enforcement technologies intelligence artificial automation big data evened reality technology smart devices case computer version detection of crime before happen research an going applying to create prediction algorithms CCTV, robotics enforcement dangerous technologies probability autonomous ,radar system radio ,
-orbital solar power plant for energy base research spatial energy power plant private sector project..

Career police development system engineering electrical. key
Investigation conduct logic case argument design crime .resource data base...crime engineering electrical manufacture design engineer fault find system.analyse key logic form supply
Form sheet line judgment police statement control logic system.claud.
Processing crime engineering electrical and design supply inspect affidavit, for clearance for complain form system indicator docket documents database electronics Manuel judge book PC system record system analyst caracteristique system function .

7. Requireded: power meter technical, metering calibration laboratory sans class 0,2s Single phase certificate.
-arced Is/IEC 17025 sanas lab capacity to calibrate large volume electricity meter and provide a valuable meter certificate Eskom municipality meter.
-benefit awarding of metering system possible to guard.
- analyzing smart metering system from a consumer.
- sans forensic calibration lab award a contract by Eskom to perform forensic calibration on meter suspect temper SPS services insure evidence chain custody is clearly the criminal or civil charge are brought to court
-measure to improve public acceptance of smart metering system designing and development critical infrastructure power grid project.
- Architecture and data flow model for consumers orienteer smart metering...
Survey advance metering infrastructure.
-survey advance metering infrastructure.
- Move framework for cloud energy metering initiative attractive research proposes a cloud energy metering system precision meter.
- reduce concern related data smart grid.
-**7.2.testing desktop application police station information management system: society control low management criminal record information Manuel development improved a desktop application record keeping for the police station is secured and functional software .**
Test and analyze.
-the system deployment, performance the testing of application automated testing tool the function performance, testing, reported the results of case pass or fail.
-login empty username ,police officer empty, test yes, test duty yes, resultant yes, email yes, , search with invalid yes ,FIR appears in grids add button mandatory fields, critical design by proper code, prioritization test cases, ms windows, general test, graphical ,user interface field frame scenario window, test environment,
-processor 13-2310,ram8.00, system type 64bit,operating system, code user name votes code ,test case
I'd, engineering, step expected software engineering.
-advanced in smart grid power grid power systems, axiom try.
-Customers are basically, 3types namely power commercial building consumer building or sector and industrial power sector power, 20kw building, 20-200kw.
-home network to implement monitoring and control and to implement new functionality DR, customer a saucy two way communication interface,
-brake test cyber security for the smart grid electrical power grid level, generation services electrical power level generation services distribution, service provider creation mechanism.
-smart metering system optimization for non technical. optimization for technical losses reduction consumption recording operational improvement in electricity sector
-power supplies, consumer smart metering system, energy regulatory, power products
-state holders involved in smart metering adoption factor, of intelligent sensor for measurements related to cost reduction implementation intelligence measure system project.
Smart metering architecture and implementation modern system mound node of the network, substation, power exchange substation power distribution point between transformation, station or the point of the power network for recording energy consumption in real time .to, the network operator.
-power line communication network PLC -RES--SM, power line communication residential smart metering residential communication smart metering ,gate way ,GPRS,GSM basic residential smart ground, serial current loop communication, power station renewal energy power station public

institutions , energies power station metering system DB-SM ,energy consumption .
ΔUri=n,sum 1=I (RiPi+X1.Q1).
F(€rs&Δu,Be,two)=Mp(€r)+VP(Δu)+=(n,sum .j=1(sum I=1.(ki.Ci.€r.j)+(BWI(t).-wie..
- number of transformation station number of consume from transformation station area ,Mp(€r).
Metering function precision as €r optimisations vector variable, VP (Δu) the power failure Δu optimization vector, ER Pp (Be). between measure electricity registered in data base,
Ki coefficient determine based on previous.
Ci coefficient describing node I, design
Ci coefficient describing node I degree of connection disconnected.
-€ri described a measuring error of power metre between +-0,5 in the case house hold consumer.
-€smc represent the value indicate by the precissions class of smart meter wi- node measure energy, AEtj estimated technical energie loss , power meter from transformation station &Δu , coefficient determine by voltage drop,Δu, coefficient determine by voltage drop registration error node.
-Po the active of consumer related to note .
RI the electrical resistance of the electrical the connection of each node node , Q1 the reactive energy recorded power ,UN nominal voltage,Bei -error coefficient of data transfer between the telecommunication systems and the data transfer between the telecommunication systems and the data storage syst Wi(t) , activities energy record in time twri-error,reactive inductive energy in analysed time interval T,
Wir the reactive energy consumed ready time model data offered by, the remote reading system implemented ,track real time energy consumption, record node comparing ,blind spark algorithms for optimization.
-main branch connection false Colum, shunt at croup.
Experimental measured, data and optimization resulted energy fore cast be recover year out of total approximately 1560, 09of losses research 1560 measure and optimization.
-intelligence measure j
-input :balance threshold , reading group output : resolution
1 procedure: mismatch patter identification Netware weir
3 feature coef search ()
4 return features xoef
5 end
6 procedure analyse (features xoef)
7 begin
8search affected zone()
9search affected point ()
10 resolution match issue ()
11 return resolution.
12.end
14 procedure main()
15.
16while true so
For each grid €reading group
Begin
Read energy rec
BAL computer energy balance
For each bt€balance treshold group
Feature coef .missmatch patter resolution analyse feature
-case study detection non technical energy balance.

Research integrity frame work college project compagy and university high school topic policy asssessment, orientation Assement , methode research
Outcome: teacher lecture career skill
Checking engineering electrical and technical trade ,
-grade level and topic electricity,/education technology, technology electrical technologies, task ,for of assessment project/research tool:, subtopic substance ,mark allocation 70,
-report follow structure: education technology power city grid transmission,

Technology electrique city power transmission, are created news
-introduction: technology electrical ,and education technology, principal electrical engineering, model Low mark allocation.

-body , education technology ,technology electricity transmission development

-Conclusion :
Resource extra research, visit local library book and magazine news papers, search internet, education technology, interview N engineering, teaching.
-project/ research : education technology implementation
-cover page ,name grade and topic
Learner and student college basic advance filling
Education technology, engineering electrical
-content index:
Introduction investigation and discuses in the report body-
Definition of education technology
City power, company mean low transmission, low substation, low
Ohm joule effect, reactance low ,
Circular assessment activities:
-assessment, subject , moderator, instruction, write nearly legibility education technology,
Cognitive level questionnaire number mark, knowledge recall, comprehensive, application,analyse synthesis evaluation,100%
-Education technology, engineering electrical career offers to college principal seignior teacher.

-Trade engineering diploma theory practical   meet theory trade test score job testify low , examination theoretical statement mark total attested /

posted site / evaluation post

Trade test and examine national diplomat engineering, duty employer post

Subject time table allocation level	**Theory Trade test Mark award 100%**	**Practice Trade test award 100%**	**Exam National Theory /test award 100%**	**Exam National Practical/ test isat award 100%**	**Grand total Score 400mark 100%,**	**Integrate assess score Min/max saqa aard qualify**
N1/ -trade theory electrical -indust -electro -eng-science -mathematic						
N2/ --trade theory electrical -indust -electro -eng-science -mathematic - - -						
N3 ---trade theory electrical -indust -electro -eng-science -mathematic - -						
N4 --electrotech electrical -indust -electro -eng-science -mathematic -electrotech -logic syst -						
N5 --trade theory electrical -indust -electro -eng-science -mathematic -electrotech -						
N6-						

--trade theory electrical **-indust -electro** **-eng-science** **-mathematic** **-electrotech** **-** **-**						
N diploma **-electrica enginering** **-total Career** **-** **-** **Yes/not**	Test total average License Theory 80% pass	Test Average License practical 80% pass	License total diploma undergraduate n diploma	License Average Undergraduate N diploma	License total	License 50% pass

Employer graduate close outcome license post engineering seignior, junior / years amend

Section 2

Engineering electrical career job workplace office place engineering outcome ,trade engineering outcom,education tech ingenieure work partnership visited meeting engineering, inovation college job functions,to government industrial experience function job.and gradient function job

industrial engineering electrical and social development.

By : TSHINGOMBEKB, tahitaditshingombe, me, tshingimbeKb

Seminaire session day confereence meeting café topic day
Presente : study governance career

Cvs   title: governement and education job engineering college
Job duty:
Section 2

Tshingombe Tshitadi
engineering electrical
engineering electrical implementation time table to job time company
experimental trade
tshingombefiston@gmail.com
Phone Number
Education
Study Program
st peace college
10/2020 - Present
,
jhb r
Courses
engineering electrical
Work Experience
Title/Position
city power   training /st peace college training
02/2023 - Present
,
rsa
engineering electrical visited work place training experimental
Achievements/Tasks
award degree diploma saqa/ award panel wiring electrical
Contact

1.content: engineering electrical career project officer outcome legislation government engineering gov.city municipality engineering theory and practical experience engineering

1.1.scope of work workplace engineering career

2.summarise: assessment officer outcomes education technology engineering : government .minister deputy government . framework mandatory compulsory student
order.in order to determine research college order to work.and regulate
- **home affairs department** ;.general requireded work visa for temporary se jour
time .v.fs.apppinrment letter completed valid ,pass port ndp critical saqa ,webmaster ..
Education department dhet basic..permit student .
Council education council trade . engineering council
Department labour and public work
Development.skill...juatice development
Power attorney.dol
I fracture social development

Department defense .police safety security
Sandf.saps psira seta permit bargaining sector competency fire arm gun operationel

-**dti department trade industries**.sector non proliferation the department of trade industry ,of weapons mass destruction council ,regulate strategic, protection interest , government control , implementation student workshop place visited ...
-**Dmr.departement mineral energy**..electricity sale revenue and prices power plant ,fuel use ,stocks,electricity independ ,national treasure economic sars department of energy mandate

responsible ensuring private sector participation in pour generation through competition bidding process come regularity primary source development electricity sector
-**department of science and innovatio**n ,socio economic development goal,resource scie bono center career.
Programme administration technology innovation cooperation.
- programme research development support.
Purpose knowledge.,.strategies,objective, developed humain generation components
Basic science infrastucture implementation of research inovation equivalente,science .mission . astronomy.
R tax incentives ama.
Department economies sars economies empires ..
- national energy regulator of South Africa authority mandate ista regulate the electricity piped gaz and petrol ,consolid jurisdiction Coe chief officer legislation , invitation to comment amendment 3800 mW ministerial determination invitation comment net billing rules **development , tribunal**,info@ nersa organ.
- electrical conformance board ECB, South Africa ,designer ,installer and the regulator custome ,
- for profit find reseller cocs ,outlet online keeping for your client ,tech competence implementation dissemination stand ,address,standard,,,
Department economies:
How much is the total power supply consumption of ATM click 24;,5,52kw,,
Unite rptibke power auplie in banking and finance sector power challange ATM ,cost consume ATM 1,3kw auxiliare automatic teller machine ATM custome size

2.2. Abstract job work: function job work ,function gradient function function
3.entry engineering electrical trade infrastructure implementation support

Qualifications career category job skills:
4.purpose asssessor criteria recruitment job ask career education and training engineering office case study.
4.1 **case study how to make calculation for a distribution substation**

1010,4kv,2x1600KVA,mean introduction substation with an installed power of 2x1600 KVA are a typical,electrical power supply facilities which can value of all relevant physical quantities shall be major equipment inside
.-basic guide for calculation dimensionning will be adequate IEC standard and practical engineering experience,of course be side electrical there civil hand HVAC heating ventilation and air condition air.

-**requirement. Substation which need**,
Continuous current calculation and dimensioning.
-short circuit calculation and dimensioning.
- **summary of selected equipment.**
- substation :when say 2x1600kva that mean two power transformer each of theme with rated of 1600kva will be installed inside substation,
-strictly speaking but not necessarily 2×1600KVA designation assume on substation.capability coverage peak power demand of 2x1600=3200Kva that further implied parallel operation of transformer .I both transformer on the other hand want will be a working unity other serve as a spare designation (1600+1600)KVA ,
-the latter mean that substation
-this example, will be based on 3200KVA peak demand requirements, beside that other major input data necessary for for calculation and designated
- medium voltage rated value.
_low voltage rated value,short circuit power short circuit current, number supply cables,
-typical of earthing arrangements, maximum ambulant temperature single line diagram of distribution,
- substation is give supplies from 10kv distribution network via two cable typical solutions for so called typically of supply
Medium voltage switchigears design tag supplies power transformer design tag T1and T2 with voltage transformation ratio of 1010,4 kV power is further distributer to consumer on 0,4KV voltage level busbar system
-power substation design system and calculation study engineering
System planning short circuit studies load flow studies insulation coordinator study

-electrical protection and and control analysis DC system battery calculation.
-ac system auxiliary power transmission.
Ground grid study lightning protection calculation.
-light nint calculation voltage drops calculation conduit dill calculation civil structural substation design,
-land survey and site grading analysis,
-geotechnical investigation and foundation calculation structural ,
Miscellaneous substation designation noise calculation .
-designation calculation transformee noise calculation harmonic analyse,fire protection,
-Ask fact answe how content fault generators to grid loads flow conductor increased power, determine trip mva transmission correct power factor.
Outcome of auxiliary tfo ground gride studies drive general arrangements plan drawing elevation section light.
-light calculation ,voltage drop 125 volt 90,PVC conduit
-outcome of conduits fill calcule wire pulled installed a combination Mont cable,
-land outcome survey determine feasibility creation storage result incorporated sit grading plan drawing,site grading ,
Power harmonic filter non linear , Draw power.

5.purpose and requireded: engineering problem mathematics engineering
-Calculation of electric field on substation equipment considering AC ion flow field ,increase of voltage in substation discharge surface high voltage conductor substation be coming influence,order stady AC substation criterion emittion calculate estimate 750kv conductor to ground distance 24,5 Conductor to 25,5 m phenomenon,
- Calculation emotion charge alternation cycle discreet time step time step instant balanced applied voltage.

Activity day	Care log	Close tende

Va=Vmax.sin (w(i-1)Δt..
Vb=Vmax.sin(w(i-1)Δt
VC=vmax.sun(w(i-1)Δt.
I=1,2,3 NT zero value value
Va= 0 VB=0,5 VC=+0,5
the first time step (I=1),. Vmax ,..vmin
Schema diagram line AC applied .
E+onset = nx(33,7+8.13/√r).kV/cm
E-onset=n(31,10x9,55/√r)kV/cm
-electrical field gth match point conductor.
Eg =3M sum Q si/2π€o[1/Rai+1/Rai.e.si]

Q on set a,sum m I qci,
Q onset b,sum 2m qci
Q onset c ,sum 3 m ,I 2m qci

6.required: 750 KVA Conductor,19,5;Min not , ca
- cable designing program,
-calculation home electrique load electrical bi.
-calculate electrical busbar size and size and drop ,
Calculate insulator resistance value,
-calculation numbers of lightings fitting and lumen output
-Calculation size of solar panels battery bank and inverter.
-circuit breaker tripping., conduit size selection program
-designation of earthing rate,
Selection of mccb,elcbfor main branch circuit
-selection of fuse and setting of instant short circuit tripping cb
Sharter circuit current calculation various point.
-size of capacitor for power factor improvement faulty current calculator.
-electrical safety program arc flash Calculation.
-E feeder and cable calculator
Squared selected capacitor size voltage drops calculation , voltage regulators distribution,
Resident load calculation.transformation .
-power line voltage faulty power line voltage drop calculation.

-electrical safety program arc Flash calculator ,power factor correction touche voltage ground electrique engineering Calculation engineering, calcule size circuit breakers for calcuationlofth, Lighting pnot asssessment regut load lush calcuation ,diesel electromagnetic.

6.requirement : power station and central system
-generator KVA , measure 20kva ,3 phase generator has trues of 16(20x0,8)=16
Rating are available so KVA range of power our site 6kva,up500kva,20kva t 100kva
-generator full load Curt calculator calcule the full load current of a single 3phase generator voltage 120v,3ph AC generator 2kw ,pf0,8 cos
Generator faulty current calcuatir ,
-cable size calculator as ,
Parameter: ,rated voltage VP the rated voltage of the generator in volt v,
Phase specific the phase arrange in phase AC or 3 phase AC generator rating, specific the generator rating kW or KVA,cos
-full load current 3 phase generator specific kW.
I=1000xSkw/√3.VLL.cosπ .
S.kw is the generator in kilo watt (kW)
-VLL is the generator line to line rated voltage in .
- Calcule the full load current of a 50kw,480v,3 phase generator the estimated load power factor, 0,85
I=1000.50/√3.x480x0,85=70,8A
-full load current for 3 phase generator specified in KVA is calculed as .
I=1000xSkva/√3.VLL.
-sva is the generator rating kilivolt amp (KVA).
Is generator line .to line rated voltage in calculate the full load current of 50kva,480v,3phase
I=1000.50/√3.×480=60,1A.
-I=1000.Skw/vLN.xcosπ. ..
Vln is the generator line .to .neural rated voltage in volt cos(π).
2kw,120v, phase generator,0,85,,
I=1000.skva/vln..
I=1000x50/480=16,7A,
3000 watt ,3kw sign 120 ,of =0,8 ,,I=3000/120x0,8x31,2
I=10000/√3x120x0,8=60,1A,,,3 phase ,240 generator, I=10000/√3x240x0,8=30
7500w generator,of,
Load,I=7500/(120×0,8)=78,1A,
-multiplication factor for stand by load=100%. Of continuous load+50% of intermittent load,max peak operating load=100% of continued load +59,% of intermittent load + 10% of stand by normal operation.load with growth.
-
Requireded:
appliance tv reliable,running 200w,15,; starting ,
2300+1200+100 rated outputs.
-load listing calculation and generator sizing ration between absorbed power and rated
-motor between 0-kw-15kw. Load
-15kw-45kw,,45kw-150kw .
Efficiency % output inputs , kW consumed by motor absorbe x efficiency x power
Kvar consumer by motor =kw2+KVA
Multiplication factor for continued load =50%
Factor=110% of max normal operating load peak operating , growth factor °110% Of max peak generator size in 70 load factor peak load factor peak load factor peak operating load with operating load with growth factor

.

Version Francaise
8.Requirements:
Poste de travaille bureau d etude:
Accueil depanage et installation Electrique Sur renovation our neouf ,mise conformity de tableaux electrique,

_ pour la protection de personnel mise en place d UN Nombre adequate d interrupter differential 30 mA contre incs die mise en place disjoncteur remise aux norm de securite ,eliminer Les risque d incendie et ou ekecteisation des personnel lies usage d une installation Electrique defectuese ,
- verification installation si bessoin
-elimination des prise et interrupter defectuex des cable Mal isole , intervention Sur haute et base tension ,recherche de pannes, installation en Voix dinners,
8.1 electricite biocompatible, information,measure electromagnetic,mourn product
-meaure et analyse des champs electromegnetic,
Effect Sur la Sante CEM Liew exploision .
-prevention et curating issue anormalie spectre.
-CEM base frequency ligne HT et distribution 230v ,HT distribution appareillage domestic hyperfrequence pulse telephone Relais, telephone,detect WiFi,Bluetooth,
-lorsqu on procedeba la measure de champs electrique et magnetiaue priorite frequement au cours ,
- Les measures la measure de la resistance de votre terre,
La measure de champs electrique et magnitude.
- la measure des champs magnetic Haut frequency realisation d une cartography de la pollution electromagnetic a votre habitations une etude completed realisat par rapport information Sur Les risque norme et seuil sensibilite , proposition de solution aux problems consent

8.1 required :
-dimmensionnement et cablage de cable ,cequi relief Tous Les xomposant d UN system electrique Ce sont le cablage fournissent l energies source d'alimentation la distribution aux appareils aux Lumiere
-type de circuit : chute tensions a 10%non critique 0,6m,,51-61,,
-chutw tension a 3% critique 5A-200a, 0-2m ,
Calibre: maniere courant AwG American wire gauge method standard pour desigule diameter des file EST mesurant le diameter du conducteur measure uniquement course file,sans isolant ----calibre file .Europ,norm AwG 00,000,00,
Diameter mm 11,68,. 10,40. 9,27. 8,25
Section 107.1. 84,9. 67,5. 53.
Code couleur
-tableaux principal coefficient global ks×ku=0,69
IB=(80+60+100+50)×0,69=20 coffee regime normal
- etude d implementation d une ligne a haute tension our a Tres haute tension lignes aeriennes construction presentation.
- l' etude d implementation d une ligne Mele etroitment Les etude technique aux procedure administration le processus complet depend des regle en usage Dan's chaque pays cependant facing procede n EST .
- l objectif poursuivit burns dbentendu realiser une ligne electrique fiabilie court minimal Mais s integrant parfait email Dan's l environment l evitment des obstacle eat difficult de passage fort que Tracee evitment des obstacle eat difficult passage font que rarement une ligne droite lots de procedure administrative le parties mise hey sont
-les representant de l etat .
Les minister charge de l ectricite de l urbanism.
Les authorite regionanales prefecture.
- Les authorite militaire.les elu Avec depute Les senateur le Conseil general public a EC Les association et organisation Les explotant propietaire.
- calcul electrique logiciel note calcul
Electrique haute et base tension eclairage public Bureau d etudes.
-cance logiciel pour l etude reseaux Haut tension alimente courant alternating pour de tension comprise entre 10000V,et 246kv IL realise Les dimensions electrique Selin le norme nf. 13-200et ie. 60909..cebec

8**.2 requirenent dimension** reseaux hate tensions en fonction de via source d alimentation et quel

que soir made d 'exploitation du reseaux mode Avec configuration court circuit minimum maximum mode normal our pertube et possible realiser fonctionnement different,
-la dimensionnement de cables en fonction des courants admnissible et des contraintes thermique ,
- le Seoul de reglage de protection .
- le calcul des temps de fusion des fusible selon course de fabricants .
-les courantsde court circuit maximum substransitaire , transitaire permeant triphase et biphase symetrique ,ICC Crete courant coupe courant permanent et default terre .
-les calcul des chute de tension Dan's Les canalisatiob electrique et aux bornes des recepteur en regime d 'etablir et au de marriage de moteur.longue du cable
-resistance electrique specifie I=P/U
Section cable effective.
A=Ixezl/Ua ....UN=12v ,p=100W,L=18,8 long conduit cable 1.8 m long conduct cable 1.8 m
2.I=P/In > 100/12=8,3A .
Section conduit cable
A=Ixexlua=8,3×0,018×18105=0,54 m .normalise 1=1mm
J=I/A >8,3A/1mm sq=8,3A density.
-les dimensionnement des appareils de protection Les courant de court circuit necessaire aux choix de caracteristique assignees des equipment et ou reglage de protection.
- le calcul de courants de court - circuit (ok) par la methode des impedance (NF EN 60-909) et partie 4NFC 13-200
-l ensemble des calcul realisation par sont confirm aux conformity avis technique guide practice ute calcyls des norme CEI ,6050202- et VDE 276. Modeliaer l installation schema unifilaire Avec affichage .
- dimension une Maison . Tenor compte de la tailed de Maison pour dimension.
- principaux critere pour dimensionner installation
- Dimension normalised
- dimension en fonction
- Nombre d equipment
8.1 etude different affichage des equipment des Donne's et resultat our Dan's chair etique etudier,Poste de livraison moteur generateur ,le calcul font la syntheses case plus ,demarage,impression dossier.
- caracteristique de Tous Les equipment fonctionnementle calcul des courent des court circuit en Tous point
- de l installation et verification des conditions normative des cables en fonction de routes .
- reponsre aux obligation reglementaire attested
- information generales Sur project.
Carnet de cables au format tableaux .
Schema unifilaire des installation note calcul
- realisation atnoptique HT.
Rapport de calcul hr .
Plusier post Avec une touche hta et plusieur configuration de fonctionnement.
- reseaux de distribution jour et au find d UN mine .
- une partie du reseaux de distribution d une usine .
- alternateue asynchrone, alimentation de post satellite,bovine point neutre bpn ,courant d enxlenxhe ENT des transformatwur.
-Calculate du courant admissible Dan's la boucle .
- valeur de reglage de disjoncteur .
-valeur de faut des courant capacity.
-valeur de reglage des default homopolaire.

2**.Fonctionnalites principales:**
-calcul effective Selin Les normes .
- mise a jour des calxuls en temp reel,
- Haut tension et base tension .
Dimensionnement et verification, dimensionnement cable cable , variation de Vitesse ,appareil Trace software.logiciel pour la conception le dimensionnement installation haute tension base tension .
- Cree Les chema unifilaire d une installation Electrique hair base tension .
- applique Les normes national et ou international corresponding pregnant en compte.
- Les source et charge Les reglage protection ,la selective,la dilation et .
- obtenire et personnaliser Les information note issue.du schema et Les chema Avec Les schemas

Avec levlogicial Les Plus courant dubsecteur ,imprimeur Les note de calcul, international,reel ,Dan's le meme projet d 'arcs electrique,d une installation Electrique Transpo (HT/htb..

8.2 note de calcul Bureau d 'etudes .

- realise une note de calcul Sur measure pour reponsre aux besoin specific des industries et simulet tester virtuellement

La terre.

Quece qu une note de calcule EST UN report calcul numerique systeme our de la piece en consition.

-calculation des structure statiaue dynamics

- correlation calcul essaies .modelisarion .note de calcul sismique pour test la tenure aux seismes.
- livrable Sur calcul vibrateur .
- tenue mecanique d une piece of d une effort et verifier si la piece Casse our non .,note de calcul Sur du thermique validation d UN nouveaux .
- billan de puissance Avec prise compte de coefficient de faisannement .extension .
- Gestion de la filiation et de la limitations.
- calcul des chute de tension,reperage auromatique St Manuel xomposant ,
- generation auromatique de la documentarion.
- generation auromatique de la .edition notes de calcule y compeis de note.
- base des Donne's constructeur .

-Gestion des borne Irv,1720.

Attributiin auromatique.module.

Coordinatiin simulation des different default de court circuit , contril de conformity , integration de Conte Sur boire optimisation

8.3 Bureau d etude . Marche European note calcul des Structure metallic Dan's l envelope du batiment euro code bureau base de calcul.

- action air Les structures,calcul des atrure beyond, calcul des structure en acier, calcul des Structure acier, calcul des Structure mixtrs,calcul structure Bois, calcul des ouvrage en maconerie ,calcul geotechnical, conception dimensionnement,calcul des structure en alliage d alluminuim ,constitue des reglaes train champ application charge de beige action thermique .
- une Vue de la Structure,Les relanchement des Barres Les conditions aux appuies ,numerotion de noeud et Barre.,coordine de charge resultat reaction aux appuies aux deplacement aux contraint aux effort internet calculate

-8.7 calcul des charge du reseaux electrique.

- calcul ecoulement des charge Dans le reseau suit a la construction nouvelle station.

-Mission vise calculer le courant des ligne et Les tension des noieds apres la construction de plusieur station electrique et l about de Gros consomateur.

-elavorer la strategies patrimonial a long term du Parc,analyser different options contractual pour le renouvelle.

-demarche et results.missiin repose Sur la modernisation reseaux electrique .calculation et simulation Group permetre Lance de calcul electrique chute de tension cable et transformateur en contraint intensity maximum.

- principales fonctionnalites.

Cartographie topologies de reseaux import dear information de la base abonne puissance souscritw consomation.personnalite de simulation de calcul Avec ajoute une extension visualisation graphics solutions collective.

- domain

.

9.**required domain d 'application distribution resaux** ;

29kv,r 49 ohm bovine j 49 ohm

-presentation plan protection hta troncon depart depart hta hey de Barre hta transo htb ,E=EMF,Zd= impedance direct reseaux court circuit biphase default Se site entre Les phase 2 et 3j1=0=-j3.j2 courant circular Dan's le phase system omopolaire phase et la terre 2j2,=-j=(a-a) Ezd+z,. a=EJ.2π/3 Les impedance zd et Zi sont egalea d our ICC bophasee = j29 =oj30=√3.E2.zd.√3 ETA t inferieur a ICC,biphase EST inferieur a ICC 2 triphase ,

Default biphase ayant une resistance negligeable EST limited par impedance dear element dubreseaux ,iccb= UN 2.√Rl2+(xhtb+Xtb+xt.

Reglage des protectuin d une arriver.ioDS= jcw.vi.10a=Vo.O.iod= vi+j(r-cd)

_required. Protection dun alternateue , protection contre Les surcharge , protection contre Les court circuit ,
-parametre dimensionnement dielectrique d UN group.
On: puissance due moteur thermique ,UN : tension assignment fournie par l alternateue ,In courant assigned fournie par l alternateue ,
Ach principal d' in group electrogene analyse course protection norm our Les besoin dear application ,reglage protection surcharge au long retard dbouvien coirbe surcharge.
- pour raison economique levmotwur thermique d UN grouped replacement peut etre atrictment dimensioned pour sa puissance nominal s IL ya une aurxhage de puissance active le moteur diesel. Billan de puissance active des charge prioritairw,une grouped de production doit pouvoire support Ter aurxhage d exploitation aurxhage d exploitation ,surcharge pour une Marche uni horaire.
-aurchage pour une Marche routes regime uniform.
Protection contre le court circuit s.
-les courants de court circuit eat d une courant aperiodic d UN courant sinusoidal ,irms..in..3.. Regime substransitaire,regime transitaire,regime permebt,alternateue Avec excitation compound surexite alternateue
- regime substransitaire apparition d UN court circuit aux bornes d UN alternateue,Les courant s etablit d'abord a une valeur relativement elevee order 6a 12In pendant premier cycle o a 20 mile second l amplitude d une Tel courant de court circuit eat definite par,
-rea tamce substransitaire de l 'alternateur.
- le niveaux d 'excitatiob prealable instant du default.
- l ' impedance du circuit default impedance court - circuit de l alternateue a consider t la reactance substransitaire Xd second expeime en % u. Tension phase neutre par la construction XD ohm = UN xd/100s
S=√3 Un.In..
Regime transitaire: Se site de 100 a 500 ms apres l apparition du default partire de la periode jusq 15,2fois le courant In
- le courant default pendant 10 second habituellement a 2 a 3 fois le courants.
- Plein charge de l alternateue calcule charge debl alternateue .
Calcul du courant de court circuit. Les constructeur precise en general Les valeur des impedance et constant necessaire analyse de fonctionnement en regiment transitaire our permebt debvaleur d impedance en %,Selin dear puissance a d 'alternater.,. KVA 75to 500, XD ,XD transitairexd permenebt,resistance etant toujour negligent deviant Les reactance intensity de court circuit en periode ,
icc3=U0/XD.1/√3..XD en ..
Icc3=In/XD .100.(xden %)..Ce valeur sont a rapport du courant de court circuit aux bornes d UN transformer
..dv/St and .Di/St..MOSFET gate different driver for electrique machine .breaker
- pour une meme puissance Les courants en CAS default proche d UN alternateue seront 5 a 6 fois plus faible que ceux cette difference EST encore Accenture par le fait que le groups electrogene our en general lorsque le reseaux BT eat alimente par source normal de 2000kva le courant court circuit eat 42kva aux niveaux du jeux de Barres BT eat alimente par la source 2,grouped replacement de 509kva a reactance transitaire de 30% le courant de court circuit s etablit a 2,5 KVA environment soit une valeur 16 fois plus faible que Avec la source normal....peek

9.1 peak dv/St..Di/St turn on off dv /St .

Inductance definition derivation type quality metal iron cobalt non iron element , magnetic flux that is proportional to the rate of change of the magnetic field is known as induction,the amount of inductance requireded produces to an end could .
Factor influence inductance.
1the inductor wire has specifical number of turns..the material that was used to make core core appearance ,Faraday established the electromagnetic inductance low, derivaton of inductance look at a DC source that has the switch turned on the current flow from zero to a specific valeur causing a change it flow rate consider flux shift current flow measure in term time d¶/St use Faraday low of electromagnetic induction to solve the problem
E=N(d$/dt).,,E=

French version 8.Requirements: Study office workstation: Home troubleshooting and electrical installation On renovation our new, bringing conformity of electrical panels, _ for the protection of personnel installation of UN Adequate number of 30 mA differential switch against incs die installation of circuit breaker reset to safety standards, eliminate the risk of fire and or ekecteisation of personnel related to use of a faulty electrical installation, - check installation if necessary - elimination of faulty plugs and switches of poorly insulated cables, intervention on high and low voltage, troubleshooting, installation in Voice dinners, 8.1 biocompatible electricity, information, measure electromagnetic, mourn product - measurement and analysis of electromegnetic fields, Effect On Health CEM Liew exploision. - prevention and curating spectrum abnormality issue. -CEM base frequency HT line and 230v distribution, HT distribution domestic microwave equipment pulse telephone Relay, telephone, detect WiFi, Bluetooth, - when the measurement of electric and magnetic fields is frequently given priority during the course, - Measurements measure the resistance of your earth, Measurement of electric fields and magnitude. - the measurement of high frequency magnetic fields realization of a cartography of the electromagnetic pollution at your dwellings a completed study carried out in relation to information on the standard risk and sensitivity threshold, proposal for a solution to the problems consents 8.required: -dimensioning and cabling of cable, which relief All the components of an electrical system These are the cabling supplying the energies power source the distribution to the devices to the Light - type of circuit: voltage drop at 10% non-critical 0.6m,,51-61,, - chutw voltage at 3% critical 5A-200a, 0-2m, Gauge: current way AwG American wire gauge method standard for desigule diameter of wires EST measuring the diameter of the conductor measures only run wire, without insulation ---- gauge file .Europ, norm AwG 00,000,00, Diameter mm 11.68,. 10.40. 9.27. 8.25 Section 107.1. 84.9. 67.5. 53. Color code - main tables overall coefficient ks×ku=0.69 IB=(80+60+100+50)×0.69=20 normal coffee regime - study of implementation of a high voltage line or very high voltage overhead lines construction presentation. - the study of implementation of a line Mixed closely The technical study with the administration procedure the complete process depends on the rules in use in each country however facing process n IS. - the objective pursued burns relaxed to achieve a reliable electrical line short minimum But integrating perfectly email bet hey are - the representatives of the state. The ministers in charge of electricity and town planning. The prefectural regional authorities. - The military authorities. The elected With deputy The senator the General public council at EC The association and organization The operating owner. - electrical calculation software note calculation High and low voltage electrical public lighting Design office. -cance software for the study of high voltage networks supplies alternating current for voltages between 10000V and 246kv IT realizes the electrical dimensions according to the nf standard. 13-200and ie. 60909..cebec 8.requirenent network size voltages depending on via power source and regardless of network operating mode With configuration short circuit minimum maximum normal mode or disrupted and possible to achieve different operation, - the sizing of cables according to the admissible currents and the thermal constraints, - the protection setting Seoul. - the calculation of fuse melting times according to manufacturers' race. - the maximum short-circuit currents, subtransmission, three-phase and symmetric two-phase permanent transit, ICC Peak current interrupting permanent current and earth fault. - the calculation of the voltage drops in the electrical pipes and at the terminals of the receivers in the establishment mode and at the motor marriage. long length of the cable - electrical resistance specified I=P/U Effective cable section. A=Ixezl/Ua ....UN=12v ,p=100W,L=18.8 long conduct cable 1.8 m long conduct cable 1.8 m 2.I=P/In > 100/12=8.3A . Cable conduit section A=Ixexlua=8.3×0.018×18105=0.54 m .normalized 1=1mm J=I/A >8.3A/1mm sq=8.3A density. - the sizing of the protection devices The short-circuit current necessary for the choices of characteristics assigned to the equipment and or protection settings. - the calculation of short - circuit currents (ok) by the impedance method (NF EN 60-909) and part 4NFC 13-200 - all the calculations carried out by are confirmed with the conformity technical advice guide pr

.10.of electromagnetic induction to solve the problem ;

E=N(d$/St)..where n is the coils number turns write equation

E=-N(d$/St)..E=L(Di/DT).....HI=NI..denote the magnetic ,B = u.H... l= NBA/H.f

L=u.N.2.A./L= u.N.π.r.r./l...

Type of induction the magnetic flux associate with a coil or circuits change any type .

- coefficient of self induction the current is proportional to the number of flux linkage with the coil,N$ is directly proportional or N $ is the number of turn could coefficient L=(N$i)..I=I amp..N=I L=¶,I Faraday N(d$/St).e=-l(Di/dt) and.
Units and dimensional formula of l it's S.I unit Webber / amp =joule Amp ,coulomb x volt amp = volt sectbamo = ohm x sec ,,M=M.L.l.t.r.A.A.....
M=K.L1.M.L2.magnetic series..La=L1+l2...la=l1+l2....
La=l1+l2+ parallel ,l=6H,. F=70HZ.,x=2.π.f.l.....x=2×3,14×70×6=2637,6
..calculus question .f(x)DX calculus according to the ohm low formula for a capacitor , capacitor currents is proportional to the time derivative of capacitor voltage, I=C.dv/St.. capacitor differentiative voltage with respect to time and this time derivatt voltage of voltage.
advanced calculus instateneous rate of change of an (x,y) ..[Dy/DX]. ,I=E/E,,,G=1/R...I= C.de/St..variable for current (I) and voltage.
- Capacitor store energy in the form of an electrical field, calculate the energy stored in a capacitance by integrating the capacitor currents (p=I.V)..over time since we know that power is the rate work (w) is done work from (w) is done work from zero voltage ,P= dw/DT,, dw=P.dt....capacitance (c) and voltage + v) into the integrand energy capacitor capacitance,
integrak .f(x)DX .. DC input output ...dvout/St..v.in ..integral
. integral out ..integral .To vin dt...
R=dv/Di.. equation diode...x=Dy/dt.(x)..y=I/int.dt
-application electrotechnique circuit rlx transformateur eclairage

Log activity day	Care day	Description calcul	Close calculation	Yes/not

11.required : besoin en energies de reglage dimension,
-determination des besoins en puissance de reglage secondaire et reserve de minute ,
- la puissance reglage secondaire et reserve minute a reserve sont dimensionnement.
-conjointment par le quote date de livraison ,le dimensit n EST plus effective trimesteiellement pour le trimesteeaui a Mais individual
-desequilibres historique du system Les pannes Se central sont exclu .
- probalite statistics de faillance des different type centre d une puissance en compte 100mv ,
- classification de dinners d entre heur date Mais jour Ferrier , details de la procedure de dimensionnement,sont dispnibles Dan's l a is Sur le dimensionnement dynamic tranche horaire de jour ,
- dimensionnement des besoins fcr
La puissance de la frequency contrainement reserve maintenir par la get allement gestionneur reseaux ,
- quantite total syst internet ,Dan's Les aystt interconnected d Europe continental resulte de

la pertubatiin de +-3000Mw ou d' une dimensionnement probaliste tenant compte de diffet facteur influence doit garantire que la

12.1 electricite ligne a haute tension ..production

,Total estime TWh,,nuclear estime % , hydraulic au file d way ,autre renouvela le, thermique a flannel % non renouvellable, thermique a flammable,

-consommable totalperte, finale,par habitant TWh, manage agriculture , industries,service %,. Transport services , commerce %, commerce exterieyr importation TWh, exportation twt ,

-Energy relever des compteur et calcul de la consommatiob ,gestionnairw de reseaux distribution,

- lire Les index Sur Mon compteur d electricite our de gaz.

-fiche pratique,relever estimate 9209meter cube, chiffre 23355kwh ,si Mon compteur electrique a deux Plein heure , heure Creuse, Je relevelea xhiffres indique numero compteur ,15,237kwh,. 12458kwh ..

12.2. Measure des harmoniques Dan's Les reseaux electrique, procedure pour l analyse harmoniques du resaux ,

-action correctives ponctuelle,action preventivea a long term ,

-Quel appareil pour measure CES indicateur ,

-Quel rang d'hanarmorique procedure pour l analyse ,harmoniques du reseaux ,measure des harmoniques realise Sur site industrial.

-A titre preventif a fin d 'avoir une Vue globale Sur l 'etat du reseaux. Cartograph du reseaux,

-en Vue de measure corrective a fin de termine corrective a fin determine l'origine perturbation solution require pour l eliminer,

-port verified la validite d 'une solutions a la suite de modification Dan's le reseau de distribution pour verifier la reduction

- Les indicateur harmoniques peut etre measure expert present Sur la site pour periode temp limiter par instrument de measure installed fonction pandant UN temp period au dispositive determiner.

-action correctives: lorsque pertubatiin sont observe harmoniques sont suspect de measure ,courant et tension sont effective aux niveaux debla source d'alimentation heux de Barre du tgbr Sur chaque depart tableux general ,pour de result fonctionnement installatt etat batteries condensateur Nombre de garden ,

- determiner l'eventuel declassement necessaire des equipment.

-determiner le calibre de routes Les system de protection et filtre necessait d emission harmoniques maximal admisst

Action preventivea a longu term.

- permenebt measure ,measure certain Nombre de point, different installation Sur period situation.

-fluctuatiin source d 'alimentation.

-variation Dan's Les fonctionnement ,ajout de Nouveau equipment,

-des appareillage measure installed aux reseaux de distribution permetre des appareils des measure installed permanance derectent Suive .

-poye une Evacuation global de l 'etat du reseaux analyse preventive,

-la location de material de measure l 'appwl expert ,la connexit et deconnexion,d 'eqyipement de measure pour l 'evaluatio. Global de l etat du reseaux, l analyse Sur le tableau general,base tension oar l 'appareil arrive et ou appareilmesure equipe chaque depart ,

- pour Les action corrective IL EST possible ,determine le condition foncty ay moment de l incendie,

-desser une carte reseaux evaluation mise ouvre.

-quel appareil pour measure CES indicateur a,Les appareil measure dournisse des information valeur instance harmonies, sont conxue selon norm CEI 6100-7..CEM.. technique d essaies,this angle tensions indicateur long term 10minutw,period 1 semain,tension harmoniques maximal norm en 50160 caracterisa valeur .

-harmonique impaired non multiple,rang,ampli relative,

-harmonique impaired multiple de 3,amplitude relative UN ,

-harmonique pairs rang amplitude relative ,

-instrumwnt portable ocilloscop,indication distortion courant ,analyser numerical Fourier alfo I - U ,10 sys ,50hz 12 period 69h

-les cout des perte du transformateur court annual du pertes .

-les lertes annuel d UN transformateur eat evaluee for

Wperte=(Po+Pk×k.k)×8760..

Wperte Montana des pertes annuelle en kWh .

-Po: pertes a video en kW ,

Parameter ,specified Dan's .

La caracteristique du transformateur ..Pk perte en charge en kW ,parameter specifies envdans le caracteristique du transformateur.

-k: facteur de charge ponderee Sur l 'anne ,,,8769 : Nombre d' heures de fonctionnementlm.
Dan's l 'annee (24/24,365jl.)
- decharge ponderation Sur une journee Sur site industrial ,
Facteur de charge ,pondered,
- Sur UN jour (1440 minute) de charge
Formulae √sum t-1440,t=o..k.k.indice k xt ..
√(0,3)exp2×150+0,65 exp 3×(240+(0,85)(0,85)×330+(0,5)(0,5)×90+(0,85)(0,85)×510+(0,3)(0,3)x120)/1440
-chargr pondered journaliere eat Alor 0,724.
-chargr pondered annual vaut
√ j365 sum j=1 k.x.j /365..

CTA pertes = C× W pert X (1+I)exp n-1/I×(I+I)exp
- court total acrualiae de Perte.
C: evaluation du court Moye. Par kWh par an ,
W Peete , perte annuelle
I: taux d ' actualization,
n : durede vie esperesy trans global dea transformateur evaluation economic l achat d UN tranafo ,actualisation Cour global long sure vie achat

-CTO=PP-AxPo+Ok..
..pp :court d' achat du transfo,
A court perte a video ,Po total perte a video (€/w).
B: Cour de perte due charge exp €/w
Ok: perte du charge gaewntie .
A=Ckwh×8760(I+I)expn-1/i×(I+I)exp .n ..
B=Ckwh×8769×k×k(I+I).exp.n/1×(I+I) exp.n
-I: taux d actualisation (%.
n:sure de vie en arc.
Ckwh : prix du kWh (€/kWh)..,
8760: Nombre d 'heure de fonctionnement Dan's l ' annee 24/24,365 j ,
K:facteur charge pondered ,selecteur industrial, UE -27 charge moyen ,40%,70,%
-donne,
Type du transformateur 1000kvA ,
- charge moyenne : 65% (24/24)
-cos π moyen de la charge :0,90.
- Suree de vie economique 29ams ,
- Cour de l ' energy : 0,06 euro
12.required: NF..50464-1
-1pertes a video ,perte did 14000,perte coc 1100, perte Bob,perte Aop.
-2 perte du charge a la charge ,perte DoD,perte coc,perte perte,
3.cout indicator ref DoD ,perte DoD ,perte perte ,perte A,a
4.perte annuelle kW,
5.rendement perte.98,95,pertecox 99,16,98, 99,39
6.Perte a vide ,12264,96368234,6745,
7.perte due la charge kWh ,48114,38862,33319,
8. Total kWh ,
9.xout annuel de perte,perte Vue perte charge,,

14..Billant matiere ,,concentrateur ,indicateur . cuivre revenue, rejected 100% plumb .metallurgie luxiviation.. geotechnical
1

to

15.probabilte d UN evenement EST Nombre d issues favorable devise par le nom re d issue total .
P(A)=1-P(A),,P(AouB)=P(A)+P(B)..
.. 15.1 requireded: Usinage fabrication une mecanique qui necessite une interrupter et fusible Vue que l usine achete CES componasa ts electrique en Grande quantite.,des interrupter achete soient defectuese ingenieure qui travaille recolt dinnwr,Sur la defUlkan e de CES appareillage don't certaines sont resume,
-defectuex interupteur 6, fusible ..total
-no. Defectue interupteur 182..fusible ,total,
-total interupteur ,et fusible 208.
-probalite q UN interrupter soit defectuex ,-su la probabiltw q UN fusible soit defectuex EST une fusi le soit deferues EST 9,9625,combiende fusible so t bon ,Sikes interupteur et UN fusible defetue ay hazard ,en deduire la probalite xhouaire in interrupteur our d UN fusible qui be fonctionnement pas,divider nom re des interrupteur Nombre d interrupteur Somme des Nombre interrupter defectuex ,6-182=188,
P(N) =6/188=3/94=0,0319 si la probabiltw q UN fusible soit defectuex de 9,0625 ..soit avenement f qu UN interrupter soit defectuex 1-0,0625=0,936..

15.1.required: need for dimension adjustment energies, -determination of secondary control power requirements and minute reserve, - the secondary adjustment power and minute reserve to reserve are dimensioned. - jointly by the delivery date quote, the dimension IS no longer effective quarterly for the quarterly individual but - System history imbalances Central Se failures are excluded. - probability statistics of failure of the different type of center with a power of 100mv, - classification of dinners between time and date but Ferrier day, details of the sizing procedure, are available in the dynamic sizing time slot of the day, - sizing of fcr needs The power of the frequency constraint reserve maintained by the network manager get all the way, - total internet system quantity, In Continental Europe's interconnected systems result from the disturbance of +-3000Mw or from probalistic sizing taking into account the diffet influence factor must guarantee that the 12.1 electricity high voltage line ..production ,Total estimated TWh,,nuclear estimated %, hydraulic in line d way, other renewed, thermal flannel % non-renewable, thermal flammable, - total consumable loss, final, per capita TWh, manage agriculture, industries, service %,. Transport services, trade %, foreign trade import TWh, export twt, -Energy reading meters and calculating consumption, management of distribution networks, - read the indexes on my electricity or gas meter. -practical sheet, find estimate 9209 cubic meter, figure 23355kwh, if My electric meter has two Full hour, Off-peak hour, I relevelea xhiffres indicates meter number, 15,237kwh,. 12458kwh.. 12.2. Measurement of harmonics Dan's Electrical networks, procedure for the harmonic analysis of the network, - one-time corrective action, long-term preventive action, - Which device to measure CES indicator, -What rank of hanarmoric procedure for the analysis, harmonics of the network, measurement of the harmonics carried out On industrial site. -As a preventive measure in order to have an overall view of the state of the network. Network Mapper, -en View of corrective measure at end of end corrective at end determines the origin of the disturbance solution required to eliminate it, -port verified the validity of a solution following modification in the distribution network to verify the reduction - The harmonic indicators can be measured by an expert present on the site for a temp period limited by a measuring instrument installed function during a temp period on the device to determine. - corrective action: when disturbances are observed, harmonics are suspected of measurement, current and voltage are effective at the levels of the power source hey of the bar of the tgbr On each departure general table, for the result of operation installatt state capacitor batteries Number of garden, - determine any necessary downgrading of equipment. -determine the caliber of roads The protection system and filter required maximum allowable harmonic emission Long-term preventive action. - permenebt measure, measure certain Number of points, different installation On period situation. - fluctuatiin power source. - variation Dan's Operation, addition of New equipment, -measure devices installed in distribution networks allow devices to measure installed permanance derectent Follow . - poye a global Evacuation of the state of the networks preventive analysis, - rental of measurement equipment for the appwl expert, connection and disconnection, measurement equipment for the evaluation. Overall state of the network, analysis On the general panel, low voltage where the device arrives and where the measured device is equipped each departure, - for corrective action IT IS possible to determine the functional condition at the time of the fire, -draw an evaluation network card opened. - which device to measure CES indicator a,The measuring device provides information on instance harmonic values, are designed according to norm IEC 6100-7..CEM.. test technique,this angle voltage indicator long term 10minutw,period 1 week,voltage harmonics maximum norm in 50160

characterized value. - non-multiple impaired harmonic, rank, relative amp, - harmonic impaired multiple of 3, relative amplitude UN, -harmonic even rank relative amplitude, - portable ocilloscop instrument, current distortion indication, numerical analysis Fourier alfo I - U, 10 sys, 50hz 12 period 69h - the cost of transformer losses short annual losses. - the annual letters of a processor are evaluated for Wloss=(Po+Pk×k.k)×8760.. Wloss Montana of annual losses in kWh. -Po: video losses in kW, Parameter, specified Dan's. The characteristic of the transformer ..Pk load loss in kW

16.requirement : function functions..

Psychology's b, function job analysis function job analysis is the examing job requirements ,and assigning the right conditions, qualifications no rwing condctu no arm ,lifting ,
-functional job analysis is method used hr (I/o) psychologie expectation of their specifical position private .
-project work job roles that requires intermediate math skill essential job roles call ,job role alarming state math skill ,job roles for those with intermediate ,how to use intermedt create an assessment group arround ,valuable and important resource in any company job emphasis on qualitative assessment.
-work or conducted that require cooperation between management compagny and its workers a typical compagny workshop ,communication verbak Please to grade the output employer,
-Different classification system for the position analysis question Aire is standard position.
- functiin : job analysis is qualitative assessment form Whixh means focus combine organisation impact overall operate conducting assessment,
-Compagnies and organisations scrutinise virtually .
- the scale of workplace definitely.
The are many ways to conduct functional occupation analyse but measure scales data thing instruction ,scales reason ,math language, resource, employee supplier to employees job physical measure , qualifications measure ,
- psychomotor : and psysical requirements of job the job analyse survey is mostly used rate the functionni requireded of job rating. The function Al rating analyse process may occupation analysis,
-job description: ,resulting from the primary resultat of a job analyse job session is new job description function hr DEP ,security duty statement offer.
-Categories of information regard both job prospective,things data worker instruction ..
Function job analyse :user computer to collected and collate data and draw conclusions, constructy worker use home physical tools to accomple building task,the tools must be as up date as possit collective conditions candiat for position,process relevant compagny work instruction basic , completed .
Function in the real world when we introduce student to the functions we typically bring the concept

to life through the idea of function machines but function.
Function machines s: students easily grasp of funct machine input something happen .function rules and input can predict the output determine the input image imagine if input ..metaphors event nby setting a large card input slot machine mysterious function rules,student input the class ,input 4,5 Output 5,15..find the composition function in loving 2or more functy the teacher or student create spread sheet function machiy, job functions sound .job title ,job read roles
-job function meaning: wath is the purpose of job functions is a job positions to give completed description of the primary responsabilite ,the emplee will perform we define,job functions as a detailed list of employee action and duties part the roles job function ..job function vary position but list job supervisor department team provide support training to support meme er protocode for increase maintence a working document.of best practices,report to director: job it clear great ,job function ,work function essential work function essential functions work funxty .job it clear great .job function essential functions .
-job function vs job titles a job function is usually list of responsibilitie ,job title ,tags ,job description job content,job descrip management..
-gradie t in real life ,part wath is a line line extend fevere beyond director a line segments ray end point , gradient of a line .want to keep learning math subject knowledge graphs function solving equations..
Y=4x.x.x-2x.x+7.....0point (1,9)
Take derivation respect 12x.z-4x...coordone (x=1)=...x gradient = 12(1)+1)-+4(1)=8..gradient function (1,9)is 8
- to find the gradient of function point slop point derivative point ,find vector function .problem to calcule gradient of this loss function ..
- .c (y,w,xb) 1/n,nsum..I=1 max find derivation vector is network dual quantity neural matrix operatt .
-Gradient of scalar function ..
f(x,y)=3.x.x.t   hange to change function partial derivatives..gradient
g(x,y) ..matrix ..y1=F1(x)=X1. .y2=f2(x)=X2, yn.fn(x)=xn

17. Requireded: calcul taux de charge eat le rapport en pour ,du courant preleve aux borne du disjoncteur ceat Somme des courants transitaire Dan's Les canalisatiob different Sur courent nominal transfo.
-Inontra transfo=I1+I2+I3+I4..Disjonc transfo 400kvA,, charge different ..
Heure,, depart 1phase 1.2 3 amperage
14h00
20h000..

18.required : government .minister deputy government . framework mandatory compulsory student order.in order to determine research college order to work.and regulate
- home affairs department.general requireded work visa for temporary se jour time .v.fs.apppinrment letter completed valid ,pass port ndp critical saqa ,webmaster ..
Education department dhet basic..permit student .
Council education council trade . engineering council
Department   labour   and public work
Development.skill...juatice development
Power attorney.dol

I fracture social development

Department defense .police safety security
Sandf.saps psira seta permit bargaining sector competency fire arm gun operationel

-dti department trade industries.sector non proliferation the department of trade industry ,of weapons mass destruction council ,regulate strategic, protection interest , government control , implementation student workshop place visited ...
-Dmr.departement mineral energy..electricity sale revenue and prices power plant ,fuel use ,stocks,electricity independ ,national treasure economic sars department of energy mandate responsible ensuring private sector participation in pour generation through competition bidding process come regularity primary source development electricity sector
-department of science and innovation ,socio economic development goal,resource scie bono center career.
Programme administration technology innovation cooperation.
- programme research development support.
Purpose knowledge.,.strategies,objective, developed humain generation components
Basic science infrastucture implementation of research inovation equivalente,science .mission . astronomy.
R tax incentives ama.
Department economies sars economies empires ..
- national energy regulator of South Africa authority mandate ista regulate the electricity piped gaz and petrol ,consolid jurisdiction Coe chief officer legislation , invitation to comment amendment 3800 mW ministerial determination invitation comment net billing rules development , tribunal,info@ nersa organ.
- electrical conformance board ECB, South Africa ,designer ,installer and the regulator custome ,
- for profit find reseller cocs ,outlet online keeping for your client ,tech competence implementation dissemination stand ,address,standard,,,
Department economies:
How much is the total power supply consumption of ATM click 24;,5,52kw,,
Uniterptibke power auplie in banking and finance sector power challange ATM ,cost consume ATM 1,3kw auxiliare automatic teller machine ATM custome size,

18. Requireded: energetical electrotech energy and electroenegetical ,mass government , weighting government products v

net metering basic,metering credit ,calculation and billing , designing net metering faculties, common mistakes, minimum, monthly reliability , additional resource ,mass
- renewal .electrical compagny state low
Requireded.
-distributiin compagny ever source and private megawate ,,national gride ,electrical and private cap megawat.
-small hydro electrical
- class number and size private facility
-class1 metering and 60kw or less.

-class2 , 60 kW ,mW
-claaa metering facility ,2mw,type, sust ,assurence metering dockets system rules single parcels sub division,owner or operator , municipality ,10mw ,self designed comin mystek .

-eskom entrepreneurs commissioner electrical split meter program, Eskom Gauteng electricity network infrastructure upgrade programme ,main objective initiavie, reliability aupllt and empowering them to control and manage their consumption is currently rolling out smart prepaid metre in Sandton specific targeting ,mall programme , consultation process , meeting,castomer educate , customer awareness,fortune ward meeting, explainning benefic free basic electricity , Bloc tariff .
The meter ciy,costomer interface unite ,smart prepayment split metering solutions, remotely,display,smart metter ,allow,capable two way communication, between custome road , information meter , programming up dates,automated , instruction sent to the meter to interrupt,
-the power supply prepaid ,
-meter/demonstrate//CIU///

19.1 Circuit diagram of analogies energy meter:-
System input phase parallel act DC power supplies,counter kWh ,load side
Line voltage,PGA or,ADC2,ADC1,X,and digital ..residential outlet.
- system control =1,display =1,quadrant metrology processor =1, voltage sensor =1, current sensor=1, terminl block=1,

-digital energy meter ,powers supllies yes and max 2,3,2=1,Db connector =1,smart card reader , micro controller l =1, optocouple =1,load digital energy meter ,relay ,LCD,main spply

19.2requirement: ATM term standard automae teller machine it an electronic device that is used only bank customer to process account transaction the user access their account their account through a special type of plastic,card that is encoded with used information on a magnet atric the strip contain an indentification coderhat is transmitted to the bank central computer but modem the used insert the card into atm to access the account and process their account transaction invented but jgon shepherd in 1969..

Bloc diagram for arm machine system ,
-start yes,walking to insert card y es, insert , waiting to enter yes the pin yes, waiting to check to pin yes , waiting to enter amounts yes, waiting to enter amount yes, verify balance yes,get cash,in correct pin eject,
-users or engineering entry exit hard , generic iso ,IEC model for functional sizes measure.
Block diagram ATM ..
High security module yes memory test,key pad yes car reader yes ,etc yes cental unit output lcddriver yes display yes, motor driver output yes,speak driver yes, relay yes AC switch driver yes ,ethernet yes and dsk yes communication,powerreser yes,power supplies yes standard device,
-input device the input device like card reader and keypad,
Card reader :the card is an input device read data from a card,card is part of the identification particular account number and the magnetic stripe on the backside of the ATM card is used for connection with the card the card swiped pressed ,jet pad,after machine ask identification unique balance inquiring pin so draw money

20.required:une case diagram for Bank ATM systems ,system aliw custome access clerk cashier or bank teller work ,step authenticak ATM plastic ATM card users name and pin ,user name and pin ,use case diagram for .
-check balance yes , deposit funds yes, withdrawal cash yes , deposit funds yes , atm transit yes , extension point menus provide, custome yes, custome button yes extension,atmb..

-enter card used name ,invalid,request ,with draw display ,case diagrams Bank ATM , maintence yes, repair yes,replanch yes up grade diagnosis,

-software engineering ,state transition diagram for an ATM systems,use case diagram for library management system,
-use case diagram for online banking.
-DFD for ATM systems,
-difference between use case and test case.
-state diagram for online banking system.yes
-Data flow diagram for online banking system.yes
-Class2 diagram for mall management system.
-class2 diagram for hotel manage system .
- class diagram for theatre management system .
-class2 diagram for bus standard.
-class2 diagram for airpor management system.
-Class diagram for scholaire.
-software class test .
- rules for data flow diagram.
- components basic diagram.
-short note activity.
Information system development.
.. components diagram.
Customer Console yes..ATM machine yes ,bank database yes ,card record yes, atm transit yes,employee Consol yes ,client yes desktop yes,
- flow charter organisation concept map network diagram,use case mind mapping ,wire frame, Orders yes, item yes, product yes, custome yes,

-----+++schematic diagram of the printer.
Inspect camera yes, pressure control yes,temperature control yes, amplification yes ,jet driver yes , control yes system ,".y motion controller temperature control yes,

21.required : engineering electrical . machinery motor and generation AC DC
courent..transformer.relay contactor field electrotech..
.contents : namenclature and name plate information..I'd permit,, step 1
-Dc motor theory ,step 2 disassembly ,step 3,step 4 armaturea, steps 5 frames, 6vemtilation and accessories,7step ventilation and accessories ,step 8 motor assembly and final test ,step on site troubleshooting ,step faillure analyse ,step DC machine data sheet ,carbon bushes , current , density and performance,step installation ,step startup and Basile information,step operationel monitoring and maintenance,step motor and baseline installation data,how to read a motor nameplate,step motor storage recommand
-step how to rewinding and electric motor ,step disassembly motor , steps wipe off,step remove the motor ,step pictures step force armature ,step cut the old winding,tips enamel or nulon and polurethane coated magnetic wire ,
-step electric motor insulation papper,step utility knife step wire cutter,flat blade screwdriver plier lint ,free cloth work gloves , motor rewinding process,
+ 1 remove windings,removal insulation papper clean housing,burn remnant of insulation, prepare new winding ,on a spool,insert new insulation papper into housing ,papper into ,step solder and insulate windings end .plie off solder end ,varnish windings reasemble motor test.
-analyse 3 ph 3000rpm magnetic field , motor inscription board , motor nominal voltage nominal current.pf rotation r.p.m 5%frame 1,5disamble removal bearing pain,
-calculation parameters for New winding
IP 87 mm, Db =128,2mm,75,5mm,package dimensionnement of iron core measure length of stator package io =87mm,
- diameter of stator package Dv=128mm inner diameter of stator package D=75,5 mm number of stator gaps z=24

-step calculation of parameters for New winding

Now measure dimension of stators slot , width of stator slot ,b1=6,621mm , b2=8,5 mm height of stator slot h = 13,267mm opening of stator slot ,no=2mm, height of slots neck a 1=0,641mm tooth width bz =3,981mm
-Qu=π/B.(b1.b1 +b2.b2)+h/2(b1.b2)..
e=Qu=π.b.b/4+hb..
-calculate number of poles pair ..
P=60.f/NS=60×50/3000=1..pole number ,speed 2810..
-calculate pole step £=π×D/2.p=3,14×75,5/2,1=118,53mm.
-t: pole step,
-calculation pole surface .
Qp=T.lp=11853,87=1031211mm,,=103,12mm
-calculate pole surface:
Heig of lamel 1mm 0,50 to

-heigh of lamel in m 0,50 to 0,65
Type of isolation papper 0,88 to 0,90
-lacquer 0,90 to 0,92 , phosphate 0,92 0,94 no isolateur 0,99
Iz = Ki .LP = 0,92×87=80.04m

-calculation of the tooth length Hz =
Hu+a1=B,267+0,691=13,908m,,
hz-tooth length, Hu height of stator ,
- calculation height of the yoke stator ..
hj=1/2(Dv-D-2.hz)..
=1/2.(128-75,5-2,13,907)=12,342mm..
-hy :heigh of the yoke ,Dv external diameter.
-step calculation the cross section of teeth of one pole .
Qz=z.bz.iz/
2.p=24.×3981×80,04/2×1=3823,67mm=38,237cm ,cm

day		

-Qz one - tooth cross section, z number of slots,bz tooth ,width
qualation of slots
-Q4=π/8.(b1.b1+b2.b2)+h/2(b1+b2)=
π/8.((6,621)(6,64)+(8,5)(8,5))+ 6,621+8,5)=93,4mm
-calculation numbers of slots per pole an
..q=z/2.pm=24/2.1.3=4
.q- number of slots perpoles ,z= number of slots-

Step calculation of pole step inslots £=z/2.p=24/2×1=12.
Winding factor
..q=1,3,4,5,6,7,8,9
..€=1, ..0,99..0,960...0,95...
-€=€z+€r....

Day			

21. Requireded:calcuation of the induction in the teeth of the stat

-Bz=Bzr.×Qp/Qz=0,65×103.12/38.237=1,753T.
Bz : induction in teeth of stator ,bzr induction in air gap.
- calcuation of the magnetic flux of one pair of poles .
d= Bzr.Qp/1.5 exp.7 =0,65×103×13.(10)(10)(10)(10).=0,00427wb
.¶= magnetic flux per pole Webber.
-calculation of the calcuation .
Number of turn in the phase .
W=0,22.uf.a/d.f.€=0,22×230×1/0,0427×50×0,958=247,39..W- Calcuation number of turn in coil ,if phase voltage ,
- a number of parallel branch..
-flux of I pole Paire ,
Step calculation of calculation number of turn in slot, Du=6.w/z=6,247/24=61,75,,
Su calcuation number of turn .filing
-Calculation of cross section of wire .
q'v=Qu.fu/du=93,4×0,34/62=0,512mm
q'v= cross section of the wire , ..
Qu=surface.of slot.
Step calculation of thickness of wire
DZ=2.√q.v/π=2.√0,512/3,14=0,807,..q'v cross section of the wire mm.+/2% range of resultat picked 0,8 mm wire measure length connected of reassemble,motor ,400v,380v...

23.Requireded: an Expiremental in transformer rewinding Instructables,

-step : material and tools ,step2: dismantle the core step 3un rewinding the old , secondary ,, Step determine the wire thickness , steps 5,test winding ,step 6,
-purpose of rewinding of Dore keep the transformer from buzzing and to seal it form environment the lamination hard to removes measure volt , material blowtar h ,hacsaw small sharp chisel,micrometre ,balance ,
-requirement enamel,wire coil from transformer ,insulating varnish windings b,wind ratio 320:12=26,66
Manufacture , operation service .
Requireded 25:

-Generator stator rewinding:record ,gas turbine steam turbine, generator,stator bar mechanical dynamic completed rewinding of generator ,removal stator wedge and stator ,slot wall core event ,inspected tested using elcod ,glasky source , confirm material,
- connection ring , installed Serie bronzed induction block Serie ,
Input data unit ,
L=1000 uH requireded index
A=14,5 mm dimension .A
B=2,95 mm dimension B
C=6,7 mm
D= 1,65mm
L=4,7 mm. Slot
G=0,5mm, ur=200 relatute .
-number of turn N=152, effective magnetic path length ,le=18,998,Crosse section.Ae=185547 mm sq,effective core volume , Be =333,347mm cub,peak lumi by cores, IP=0,800A

24. Generator alternator and turbine repair and maintain m,c power generator house 14000 .mm sq ., 80ton to 100toneboverhear crane conditions power up to 373MVAto400MVA , manufacture quality control roles ,
-Electrical power generation minor and major generator .
-design or type of generator stator or rotor general oven houl of any design .
-modification of generator including .
-rotor and stator insulator system up grade rotor and stator cooling system.
-Rotor winding modification rotor and wedge iso .
-completed rewinding of generator .
-minor and major repairs design or type.
Minor and major ,full range of testing and conditions monitoring.
Full range of testing and conditions monitoring.
-on site and off -site balancing fail finding and route cause mechanical power generation repair .
-general overhauls of any design or type of turbine .
-Diagram refurbishment pressure parts . refurbishment and replacement spare.
-reverse engineering and manufacturing of components
-Bearing refurbishment.
-faul find and root cause analyse .
-up grade and maintenances system ,
Scope of work compilation .

-comprehsive project planning quality control and documentation
completed re blading and . balancing of turbine rotor
-metallurgical investigation ., And report run up down signature testing and conditions monitoring testing and conditions motor ,
-on site rotor repaired service.
Assessment of insulation system,
- insulation resistance,recurrent surge graph (Rsg) testing.
-high voltage testing , assessment of coik retaining volt drop testing ,on site degassing and magnetisation.
-on site stator repair service, assessment of insulation system, polarization index high voltage testing partial, discharge analyses core testing ,Elcid,power flux , engineering improvement investigation cause.
Faillure design report. VA=E×I..
Requireded:copper
Coil parameters calculator.
-wire diameter: 0,812mm
-number turn:1000turn
-babbin length :25,4mm
-babbin diameter :25,4
Rated DC current, turn wind ,number of winding coil diameter.
Examing generator performance charactere load watt =vxa..
Measure real time,full load kW=total amp×supply voltage 1100.resweve capacity=full load ,kW x 0,25 for percent power ,generatorize,fill ,generator size,full load reserve capacity.
Requireded:
Number of loops: , area of each mm, magnetic field Tesla,time of rotation S,EMF induce .

€:$2\times\pi\times N\times A\times B\times f\times\cos(2\pi\times f\times t)$
€:EMF inductor vole.
N:number of loops dimensionnement
A:area of each loop in mm.
B: magnetic field
f: rotation frequency..
t: time rotation.

Requireded:
-cross sectional area ..mm
Total length of ..
-resistance meter. ....ohm
Resistance ...ohm
Voltage rated Currnt....(v)..
Power at rated current...,.w

-

25.requirement: engineering electrical workers.departement.orientation .wastage
- .life cycle assessment:life cycle analyse is methodology associated commercial products or services for instance case of manufacture product impact are assessed from row material extraction processing cradle manufacture recycling final disposal.
-Goal and scope definition yes , an inventory analyse yea and impact assessment year , interpretation yes ,
- iso 14040 inventory energiw and material environment aspect iso phase of use data power plan energy control polutionn co2 dioxide , integration system model depletion asssessment commissioning .
-cost of installation system engineering
Cost of the cable selected and cable .total installing operating cable during.
CT=CI+CL,,,,CI=cost installed length cable.
CL= equivenlent the date the installation was purchased ,losses during life ,N year,cost of materials coat product manufacturers margin to determine,
-Economic Conductor size involve, performing calculation neglect voltage dependence losses and find cross section.minimize the cost function,
CT=CI(S)+Io.Io.(R(S).F(N)..where as function of the conductor cross ,Io=maximum load on the cable..
-E.wnwrgy semie conductor conductor cable material magnetic, destruction wastage energy maintence components.

.power Zener diode power rat
Calculation
, input
-V source 23v,vout 32v,IMAX 24ma out put Zener power rating 768 mW, resistance value -375m, resistance power rating -216m,
IZr=OM/V.Z...1w/5,1v..

-Calculate battery life ,
Input battery life input capacity rating of battery mAh,
Consumption of devices load current
Output battery life.
Capacity : measured in Amper hours ,the capacity of a battery can usually be found ,
-consumption the average current draw of the electronic device .
-discharge safety the percentage that is not utilise.
Equation, battery life=capacity/consumption x(i-di)
Application :amount of time for battery can supply power to the circuit.
Amp=1c/1s=Q/t,. I=Q/t=900/3×60=5A,
Q=Ixt, ,,I{Q/t,,,Q=Ixt=3Ax90s=270 coulomb,,p=j/c,..xC/t=j/t..

Dimensionnement geometry mass energy destruction.
-dure vie molecules 5ans,traitement dechet ,en combien temp Se degrade in chewingom sac plastique base matiere organique dechet degrade seulement 2semaine,1 metal rouiller integrals 100a1000 Ans pour ,plasty polystea matiere synthetic Egypt..
Conservation energy ,,transformation energy annee Lumiere 360jours ,, destruction material 100-99 force energy destruction recyclage Vieux systeme renouvellable,breaction magnetic induit reaction energetizer.xl..E,q,v
-Electro energie Chauffage..
propos etude conception et fabrication resistance chaffage electrothermique,
-activite: Chauffage,product et service .
Service Devi's material electroteat..

Indicator

Re: Ticket ID 35221 - Resolved and Closed - Re: sasseta, register granted sasseta company learn

Inbox

T

TSHINGOMBEKB TSHITADI Wed, May 3, 7:53 PM (3 days ago)

to PSiRA, tshingombe, tshitaditshingombe, me, tshingombekb, NBCPSS, NBCPSS, nationaloffice, reception, dtrrc.rxtemsion22

On Wed, 03 May 2023, 14:21 PSiRA - Digital Support Team, <digitalsupport@psira.co.za> wrote:

Dear TSHINGOMBEKB TSHITADI,

Your ticket - Re: sasseta, register granted sasseta company learn with ticket id: 35221 - has been closed.

Description of the ticket:

CAUTION: This email originated from outside the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

On Sat, 21 May 2022, 11:20 fiston tshingombe, <tshingombe520@gmail.com> wrote:

---------- Forwarded message ---------
From: **fiston tshingombe** <tshingombe520@gmail.com>
Date: Sun, May 15, 2022 at 1:42 PM
Subject: sasseta, register granted sasseta company learn
To: fiston tshingombe <tshingombe520@gmail.com>, <sassetacommunications@sasseta.org.za>, SASSETA <ibowden@sasseta.org.za>, Sasseta AGM <AGM@sasseta.org.za>, <info@seta.co.za>, <etdpseta@behonest.co.za>

Purpose: This form is for New, Extension of Scope or Re-registration as a constituent Assessor of the ETDP SETA.

Section A: Assessor Application Type		
Application Type		Evidence Required
Assessor		· Application form · Copy of the ID document · Copies of qualification(s) (Certificates, diploma, degree, etc.) · Curriculum Vitae
		· Application form · Copies of qualification(s) (Certificates, diploma, degree, etc.) · Curriculum Vitae
		· Application Form

Section B: Personal Information	
Title:	...tshingombe .
Full name as per ID: (First and Middle Name)	...tshingombe tshitadi.
Surname:	....tshingombe tshitadi fiston
RSA ID or Passport or Alternative Number:	.... TIRGOG000910610
Statement of Results for the Generic Assessor Unit Standard (US ID No: 7978 or US ID No: 115753)	: 7978 ....
Assessor Registration number (applicable to Extension of scope and Re-registration)	123432344
Gender:	Male ....
Equity:	...assessment police college .
Cell No:	....
Email Address	...tshingombe520@gmail.com.

Section C: Scope of Qualification/s ***This section to be completed only by applicants for New or Extension of scope registration***	
SAQA ID	Qualification Title
	Assessor moderator engineering electrical diplomat
	Assessor moderator engineering electrical diplomat pnel waring

	Assessor moderator engineering electrical diplomat panel waring safety db boxe

Section D: Scope of Unit Standard/s

This section to be completed only by applicants for New or Extension of scope registration

SAQA ID	Unit Standard Title
	Assessor moderator engineering electrical diplomat
	Assessor moderator, assessment police
	Assessor moderator engineering electrical diplomat safety security assessment

Section E: CODE OF CONDUCT FOR ASSESSOR

If this declaration is not signed, the application will not be processed

I,	Tshingombe tshitadi fiston **….**	hereby commit myself to abide by the ETDP SETA Code of Conduct in relation to all my work conducted as an

ETDP SETA registered assessor. The Assessors' code of conduct has been drawn up to enable ETDQA registered assessors to carry out their functions objectively in line with ETDQA policies and procedures.

The Code of Conduct to which I agree is as follows:

1. Responsibilities:

- to plan and conduct assessments as outlined in the unit standard *'Plan and conduct assessment of learning outcomes';*
- to assess candidates against the relevant unit standard(s) and or qualification;
- to be guided by the provider's assessment plan, guide, tools and reporting format;
- to assess in a fair and transparent manner, avoiding bias and addressing barriers to learning;
- to judge evidence observing the rules of evidence and to give constructive written feedback to candidates; moderators on unit standards and qualifications.

2. Declaration of Interest:

Section E: CODE OF CONDUCT FOR ASSESSOR
If this declaration is not signed, the application will not be processed

On being requested to assess a group of candidates, assessors must inform the provider in confidence:

- Whether they have (past or present) a family relationship with any of the candidates;
- Whether they might have, or be seen to have, difficulty in assessing any candidate objectively because of friendship or other obligation; and
- Any other actual or potential conflict of interest involving candidates, moderators or other relevant parties.

3. Working Practices and Quality Standards:

- Assessors must act professionally, accurately and in an unbiased manner and be responsible for their actions in the assessment process.
- Assessors must not accept any inducements, commission, gift or any other benefit (apart from fair payment), or respond to any threats or harassment from providers, their employees or any interested party, or keep silent about any colleagues who do so.
- Assessors must report any assessment irregularities, complaints or appeals and any attempts to threaten or bribe to the ETDQA in their reports.
- Assessors must not intentionally communicate false or misleading information that may compromise the integrity of any assessment. Assessors should keep relationships with candidates, moderators and providers on a professional basis.

4. Confidentiality

- Information on a provider’s practices and procedure gained during the assessment process remains confidential to the provider and any information about individual learners and their organizations should remain confidential.

5. Relationship with ETDQA

- Assessors are registered with the ETDQA; this constitutes a license to practice in the sector;
- Complaints submitted by assessors to the ETDQA will be addressed by the Irregularities Committee;
- Complaints submitted about assessors to the ETDQA will be investigated, and should the assessor be in breach of the Code of Conduct, the assessor will be de-registered, and no longer able to practice as an assessor in the sector.
- Should an assessor believe that he or she has been unfairly refused registration, extension of registration, or been unfairly de-registered; the ETDQA has a proper appeals procedure which should be followed.

Signed	Tshingombe …./tshidi

Saqa n diplomat no meeting ,

TDIs are being updated and will be completed before the final submission.

KPI and KPI	SHORT DEFINITI ON	Purpose and importance	Source collection data	Method of calculation	Data limitation	Calculation type	Reporting cycle	New indicator	Desire performance Indicator responsible
Percentage Number of dwellings provided with connections to mains electricity supply by the municipality The number of new residential electricity connections to dwellings provided by the munic	Provides a brief explanation of what the indicator is, with enough detail to give a general understanding of the indicato	Explains what the indicator is intended to show and why it is important	Describes where the information comes from and how it is collected	Describes clearly and specifically how the indicator is calculated	Identifies any limitation with the indicator data, including factors that might be beyond the department's contro	dentifies whether the reported performance is cumulative, or non-cumulative	dentifies if an indicator is reported quarterly, annually or at longer time intervals	Identifies whether the indicator is new, has significantly changed, or continues without change from the previous year.	entifies whether actual performance that is higher or lower than targeted performance is desirabl engineering responsible
measures the average	It measures the								

length of a sustained customer interruption during the measurement perio	level of Repairs & Maintenance to prevent breakdowns and interruptions to service delivery								

o
SLS,
Jul,Aug,Sep,Oct,Nov.,D
y,Jun
1
Average time taken to
repair logged
Average time taken to repair logged streetlight queries (Secondary Roads, Main Arterials and Area lighting)
Percentage resolution of logged illegal connection queries within 30 days
–
multiple properties.
Percentage resolution of logged queries within 30 days.
Percentage of Domestic meters read as per the download file
verage time take to

Contract government and education sector society development compagny relate low , career

MANAGEMENT AN D ORGANISATIONAL STRUCTURES

6.1 Organisation Structure .

The situational analysis indicates that City Power requires a fundamental culture change that will respond to the chaning environment and drive the 2022 VUCA strategy. In order to succeed in its strategic mandates, City Power needs to develop the ability to improve the design, development, and implementation of initiatives and to reduce cycle time in all organisational activities.

2020/21
Engineering Operations
Engineering Services
Metering Services
Office of the CEO
HR & Transformation
Finance
Business Sustainability
Enterprise Support

he stakeholders of City Power have been segmented under different governance structures as follows:

Governance Structures
Detailed stakeholder definition
Why it's important for us to engage
Ways we engage
Re-sellers of power
These categories of customer re-sell our product. They

The strategic intent of City Power includes ensuring that the business performs in a stable nurturing environment that is conducive to the achievement of its objectives, whilst building an exceptional workforce of competent and committed people who provide leadership and advocacy for our organisation. In order to enable this, City Power has defined five human capital strategic levers (Capacity, Capability, Commitment, Compliance and Continuity) thus aligning the people strategy with the City Power strategy and current realities. For City Power, talent is the number one impediment or success factor in executing he table below shows appointments finalised to date in line with phase one of the talent acquisition plan for FY

interact directly with electricity consumers

♣ Reliable electricity supply

♣ Affordable electricity supply

♣ Working electricity meters

♣ Recognition

♣ Face to face dialogue

Funding options

The means of funding the various portfolios of alternative energy are still being explored, in light of the recently promulgated New Generation Regulations .

The regul s per the Board approved organisation structure the City Power Management Team is comprised of the following:

Level
Number of Employees
Number of Vacancies
EXCO
Chief Executive Officer
1
1
Chief Operating Officer

1
1
Executive
:
Engineering Operations
1
0
Executive
:
Strategic Assets
Deve

Delivery has failed to these recipients or groups:

RECRUITMENTSCD@citypower.co.za

The email address you entered couldn't be found. Please check the recipient's email address and try to resend the message. If the problem continues, please contact your helpdesk.

Diagnostic information for administrators:

Generating server: CPRVNMSEMR01.citypower.co.za

RECRUITMENTSCD@citypower.co.za
Remote Server returned '550 5.1.1 RESOLVER.ADR.RecipNotFound; not found'

Original message headers:

```
Received: from cprvnmsemr02.citypower.co.za
(172.17.20.105) by
 cprvnmsemr01.citypower.co.za
(172.17.20.104) with Microsoft SMTP Server
(TLS)
 id 15.0.1497.32; Tue, 25 Apr 2023 15:08:08
+0200
Received: from post2.citypower.co.za
(172.16.0.38) by
 cprvnmsemr02.citypower.co.za
(172.17.20.106) with Microsoft SMTP Server
id
 15.0.1497.32 via Frontend Transport; Tue, 25
Apr 2023 15:08:08 +0200
Received-SPF: Pass (domain gmail.com
designates 209.85.219.41 as a permitted
sender),
                client-ip=<209.85.219.41>;
identity=<tshingombefiston@gmail.com>;
helo=<mail-qv1-f41.google.com>;
Received: from mail-qv1-f41.google.com
([209.85.219.41]) by post2.citypower.co.za
with Trustwave SEG (v8,2,6,11305)
                id <B6447d0b70000>; Tue, 25 Apr
2023 15:08:07 +0200
Received: by mail-qv1-f41.google.com with
SMTP id 6a1803df08f44-
5f16be5dccfso44953816d6.2
        for
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25 Apr 2023 06:08:06 -0700 (PDT)
DKIM-Signature: v=1; a=rsa-sha256;
c=relaxed/relaxed;
        d=gmail.com; s=20221208;
t=1682428083; x=1685020083;
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reply-to:references:mime-version
         :from:to:cc:subject:date:message-
id:reply-to;

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3bQ7ZICU3w=;

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j+uZhEGAKhzt4XdBID7KxU83zx3lPtvLapUDr
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2oRL65+74GXAl1CktHPAzs1GM9wejhV

SYef0ZF12q4DJYlU7IqocmDyNPS3hfofbWNd
MUYQDPNoXHJOreraHdfSDohG3gEgVOqC
         ksnA==
X-Google-DKIM-Signature: v=1; a=rsa-sha256;
c=relaxed/relaxed;
        d=1e100.net; s=20221208;
t=1682428083; x=1685020083;
        h=to:subject:message-id:date:from:in-
reply-to:references:mime-version
         :x-gm-message-
state:from:to:cc:subject:date:message-id:reply-
to;

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3bQ7ZICU3w=;

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```

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        h6gg==
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wEf+60Gw
X-Google-Smtp-Source:
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WzmHvKbjgP+rdk=
X-Received: by
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SMTP id
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20020a056214300a00b005f9a3b5b906mr2767
4446qvb.29.1682424515203; Tue, 25
 Apr 2023 05:08:35 -0700 (PDT)
MIME-Version: 1.0
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mPT6RVROhEQSyPnNw@mail.gmail.com>

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ogle.com>

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20wHQ+xhJdo6EOhm4Q@mail.gmail.com>

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wHQ+xhJdo6EOhm4Q@mail.gmail.com

<6447c1f3.050a0220.6aa49.7297.GMR@mx.g
oogle.com>
In-Reply-To:
<6447c1f3.050a0220.6aa49.7297.GMR@mx.g
oogle.com>
From: tshingombe fiston
<tshingombefiston@gmail.com>
Date: Tue, 25 Apr 2023 14:08:22 +0200
Message-ID:
<CABd78RXofWAu22DM56V92db+fwOYx=xv
SDoXyZ0Z2d_ziTdHLg@mail.gmail.com>
Subject: Fwd: Delivery Status Notification
(Failure)
To: <RECRUITMENTSCD@citypower.co.za>,
<info@stpeacecolllege.co.za>,
            <study@stpeacecollege.co.za>
Content-Type: multipart/related;
boundary="000000000000974f8e05fa27fb8e"
X-SEG-SpamProfiler-Analysis: v=2.3
cv=VdCJw2h9 c=1 sm=1 tr=0
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a=dKHAf1wccvYA:10 a=x7bEGLp0ZPQA:10
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JAcA:9 a=3gWm3jAn84ENXaBijsEo:22
X-SEG-SpamProfiler-Score: 0
Return-Path: tshingombefiston@gmail.com
```

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ations permit the building of new generation capacity internally from own capital funds, or additional ‘Green Funding’ that may be made available through the City. The regulations also permit the engagement of Independent Power Producers. City Power will be exploring all the available funding options in order to leverage from the opportunities to build new generation capacity, and improve its energy diversity and sustainability. Furthermore, the development of a standard City and National Treasury approved power purchase agreement is an option that may present the least risk to the City and provides a means to attract into the City. The work will include City Power, the EISD, the DoE and National Treasury

The feasibility study for the implementation of a solar photovoltaic and battery energy storage system was conducted for City Power (10 facilities), JOSHCO Buildings (6 buildings) and COJ Facilities (2 facilities), based on the facility energy consumption, potential for solar production, cost of energy and lifetime cost of the system. The following observations were made:

The least cost option for the different facilities resulted in 27.527MW solar photovoltaic system with a total of 7.268MWh Lithium-Ion storage batteries. The average Return on Investment (ROI) for all the facilities and buildings was determined to be 9.32% with an average payback period of 7 years.

8.5 Proposed allocation for Energy Storage Systems

It is

It is not unreasonable that City Power should aspire to be in a position to control at least 10% of its peak demand liability using energy storage systems, specifically to manage the winter evening peak demand. When summated across the 39 Eskom intake points, the demand presently reaches a maximum of 2800 MW. Notified Maximum Demand penalties are being paid on several of our Eskom intake points, where the deployment of energy storage at any point on the related networks can significantly reduce the penalties paid.

Energy Storage systems are able to store cheap surplus energy from any source, at a time such surplus may be available, and to release the energy again when there is a generation shortfall and peak energy pricing will apply. The stored energy will always be taken from the cheapest source available and may be either from off-peak coal derived Eskom energy at night or from surplus renewable energy in the day time.

In the short term, the following Capex funded energy storage projects are planned over the next 3 years:

- Reuven System Control and Data Center, 600 kW Power Rating with 1,2 MWh capacity
- Feeder relief demonstration sites, 4 systems, each 1MW Power Rating with 2 MWH capacity
- Substation demonstration site, 3MW power rating, 6MWh capacity

In addition to the City Power the owned and operated Energy Storage listed above, Energy Storage services may be purchased from Independent Energy Storage Service Provider

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October 2020, the Department of Minerals and Energy published New Generation Regulations aimed at enabling Municipalities to procure their own new generation capacity. These regulations provide municipalities that are in good financial standing with an opportunity for generation as well as energy storage. The MFMA provides a regulatory framework that guides municipalities with regards to how to establish and manage Public Private Partnership (PPP), to enable energy procurement and trading. City Power is exploring the establishment of appropriately resourced office within the Finance and Procurement Group to drive the establishment of the required PPPs.

The feasibility of the new technologies has been partly examined as part of the Solar PV, Energy Efficiency, Energy Storage, Waste to Energy, Gas Options and Electric Vehicle work streams of the New Energy Mix Feasibility studies conducted in 2019.

According to the 2017 EPRI report used by the IRP for the cost of energy from renewables, the levelized cost of rooftop PV power was R1, 07 per kWh. The IRP bases the levelized cost of fixed tilt PV farms on the actual bids of 70 cents per kWh of Bid Window 4 of the REIPPP. This is less than the annual average cost of Eskom’s Standard period energy of 86,35 c/kWh on the Megaflex tariff.

The renewables are gradually becoming cost competitive. Furthermore, there is another key benefit in that the uptake of distributed (de

-
centralized) generation alternatives on the downstream side of the Eskom meter also reduces network technical losses and defers (or can completely avoid) costly infrastructure upgrades.

The IRP 2019 Gazette 42784 of 18 October 2019 recognized the need to accommodate embedded generation and has the proposed allocations shown in (Table 26) below. The draft plan has an allocation of 500 MW per year up to 2030 for embedded or distributed generation, a national total of 4000 MW by 2030. The allocation applies to both privately owned as well as municipal owned generation plant.

Two important Ministerial Determinations were made in 2020 with respect to the IRP. In terms of the Risk Mitigation Independent Power Procurement program (RMIPPP) allocation, the first four years of the Embedded Generation allocation of 500MW per year, the Minister determined that Eskom will be the power purchaser.

In terms of the balance of the IRP, the Minister also determined that Eskom will also be the power

1. **VACANCY BULLETIN: REF 001**

DESIGNATION: ELECTRICIAN (SHIFT WORKER)GROUP: SERVICE DELIVERY CENTREDEPARTMENT: VARIOUS SDCs

REPORTING TO:TEAM LEADER: DISTRIBUTION

TASK GRADE9 (R350 966)

Appointment Minimum Requirements:

- Electrical Trade Test CertificateAND
- N2 Electrical EngineeringAND
- Three (3) years' experience in the electrical distribution environment ANDValid Code C1 Driver's License
- Valid Professional Driver's Permit (Must be acquired within 3 months of employment)

-3.1 **Primary Purpose**:

Perform daily maintenance, repair and installation of electrical systems and equipment. Perform network operating at all voltage levels to ensure a continuous availability of supply.

To ensure a reliable and safe electrical system through the application of technical competencies in various tasks requiring a certified level of skills. Contribute towards maintaining a high level of customer satisfaction

Key Responsibilities:

Diagnose equipment malfunctions and repairand adjustusing the necessary test equipment, instruments and other tools of the trade. Install, modify and maintain new and existing systems and equipment by working from drawings and sketches and through verbal instructions. Optimally respond to all emergency call outs and complaints and ensure best possible response time. Inspect large electrical systems and ensure all City power requirements are met. Maintain all motors, transformers and electrical controllers attached to large power systems. Perform preventative maintenance on the electrical system i.eswitches, transformers etc.

Carry out scheduled plant and equipment inspection on a regular basis to ensure a safe reliable network with minimum interruptions. Repair and install LV and MV underground and overhead networksandthe associated transformers and switchgear. Ensure the right tools and equipment is available and in good condition. Assess requirements for each specific task. Confirm the suitability of equipment for possible refurbishment or reuse. Ensure customer satisfaction. Ensure compliance with all relevant legislation and SHEQ requirements.

CLOSING DATE:

21 SEPTEMBER 2022
ENQUIRIES: Ext 7343
/7687/7099
TO APPLY EMAIL: recruitment.SDC@citypower.co.za
BULLETIN:
001/2022 REF NO: 001

NB: The City Power application form must be completed and submitted with the application to the relevant email address provided for the specific position. Failure to complete and submit the form will   disqualify the applicant for consideration

Note: •City Power is an Employment Equity Employer; therefore, preference for this position will be given to
candidates whose appointment will enhance representation (especially Gender and Disability).

•

If you do not hear from us within 2 months of the closing date, you may assume that your application was
unsuccessful.

•Applicants must note that further checks will be conducted once they have been shortlisted and that their
appointment will be subject to positive outcomes on these checks, which include qualification authentication, criminal records and previous employment.

•City Power reserves the right not to fill the position or to re
advertise it. Where applicable, candidates may
be expected to undergo psychometric assessments.

•

It is the applicant's responsibility to have their foreign qualifications evaluated by the South African Qualifications Authority (SAQA) and to provide the evaluation results.

•

Please include copies of your qualifications with your applicatio

How it will benefit your career

- Join hundreds of successful graduates over the past   and add this prestigious to
- Gain the knowledge and skills to take the next steps in your electrical power systems engineering career.
- Go on to develop your career at a top employer, such as electric utility providers, equipment manufacturers, specialised software houses, universities and consultancy companies

Introduction to Sustainable Electrical Energy Systems Mandatory   Structure of Electrical Energy systems   Basic analytical skills for electrical energy systems Components associated with electrical energy systems Analysis of Electrical Power and Energy Conversion Systems Mandatory for Faults in power systems Analysis and control of large networks Analysis and control of power electronics systems Power System Plant, Asset Management and Condition Monitoring () Mandatory for

Basic principle Design of major power system plant components Asset management and condition monitoring Substation and system design Power System Operation and Economics ()Introduction to optimisation and optimal economic system operation Electricity markets and power system economics   Concepts of power system security Power system investmentSmart Grids and Sustainable Electricity Systems ( )Distributed low carbon technologies Smart Grids Sustainable electricity systems Power System Dynamics and Quality of Supply ()Mandatory for:Optional fo Power system dynamics Quality of supply Reliability- Power System Protection (Introduction to protection systems Conventional protection systems Advanced protection systems   - Business Cases for Sustainable Innovations (Project/team/business planning Ethics & professional responsibility Intellectual propertyReport writing (information sources, literature reviews, structure and presentation dissertation project will ideally be based on a problem you and your company need to resolve, ensuring the programme delivers value for both you and your employ

2. Visited student open days company

3. city Power aims to produce certified engineers over the next three years.

4. The provision of this on-the-job training will not only benefit students with required experience and addressing the issue of shortages of work ready skills in the country, it will also benefit them as the utility responds quicker to service disruption, improved performance efficiencies while ensuring skills transfer.

5. The utility has partnered with the Engineering Council of South Africa (ECSA) on a special joint initiative known as Road to Recruitment.

6. "There are not enough professional engineers in the country, this initiative is not just good for City Power or ECSA, and ultimately it will raise the competency levels of engineers in the country. We need other energy utilities to join the cause by providing on-the-job training.

7. The absence of professionalised engineers in the country is what drove ECSA and National Treasury to pledge allegiance with City Power to rectifying this shortfall. The programme is designed to challenge other utilities to follow suit and hire young minds to assist in elevating the sector through professionalisation.

Visited student technology support united trade working enginnnering electrical :

Day nigh shift sheddule

Risk Description Strategic Objective Rating Key Risk Treatment

1. **Compare visited implantation career city power unity trade design analyze investigation city power plant and st peace college ,system under going resulted assessment plant outcome annual report frame work   st peace college academic university**
2. **ref**

The **Strong Cities Network** is designed for policymakers and practitioners operating at city, municipal or subnational level. Membership is completely free of charge. In order to sign your city up to the Strong Cities Network you will need the approval of your Mayor. Please complete the below application form and the Strong Cities Team will be in contact to start the official registration process.

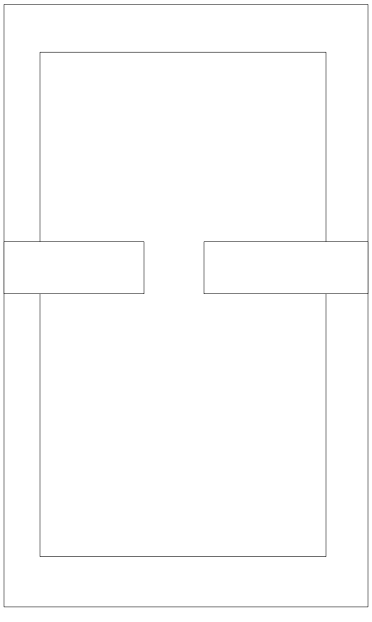
as ambitious targets f and in the era of big data and connectivity, smart cities that operate reliably, responsibly and intelligently will be key to achieving these targets. Meanwhile, the so-called ‘Energy (providing affordable, resilient and clean energy) has been identified as a critical issue Innovation , and dealing with resilience and connectedness issues is among its strategic priorities. As the population continues to escalate in urban areas, more efficient use of ICT is required to cope with problems common to modern cities, such as those related to the environment, social inequality, and governance.

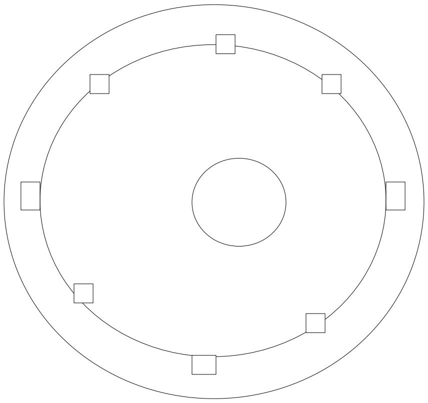
Education AND Educating FOR Innovation: THE POWER OF DIGITAL TECHNOLOGIES AND SKILLS

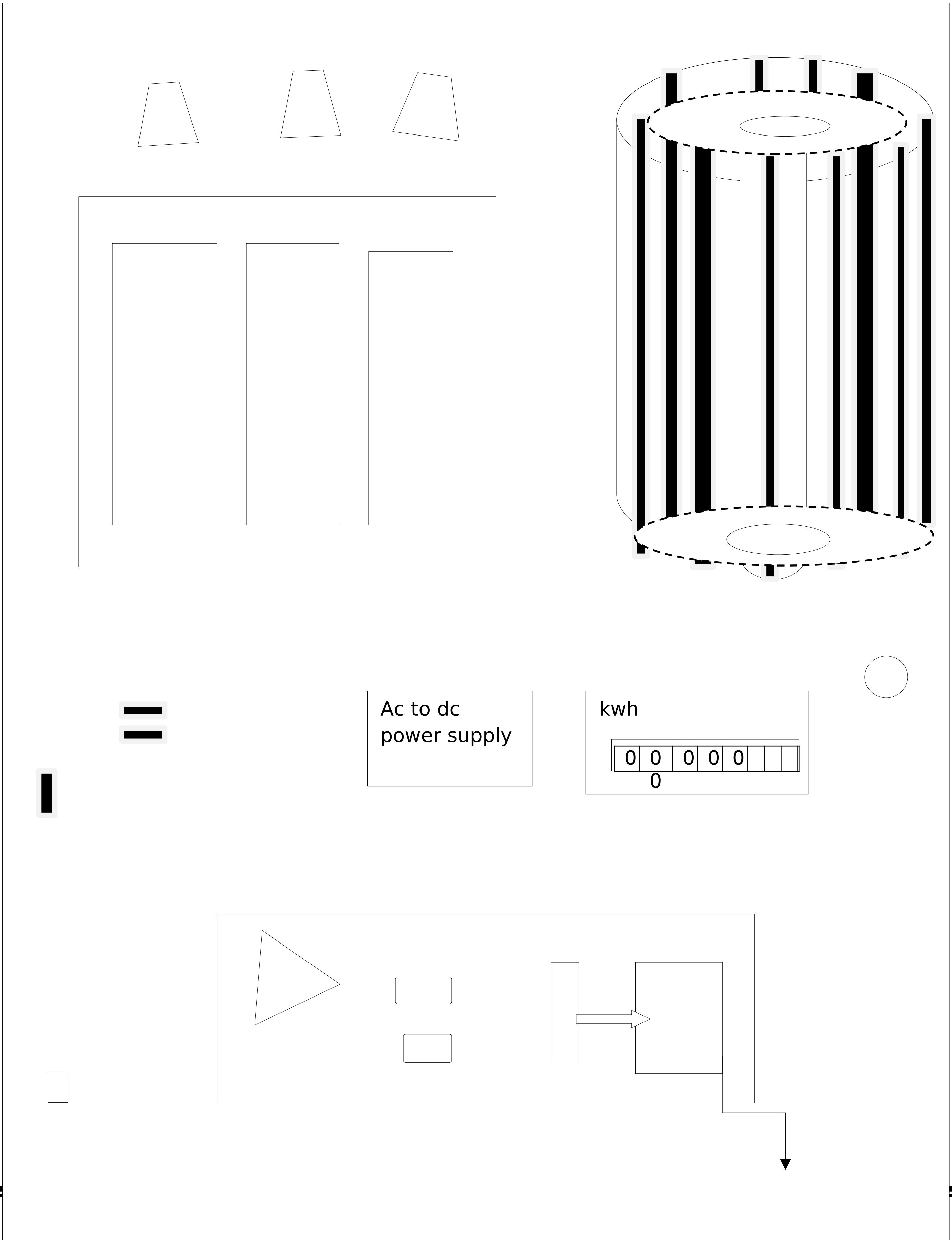
The innovation imperative in education innovation in education: why and what
Measures of innovation in education The education and skills dimension of innovation
Innovation strategies in education Key messages for innovation policies in education
Digitalization, digital practices and digital skills Digitalization .Digital skills in the adult population
Digital skills students Key messages for innovation policies in education
Digital technologies in education Integrating ICT in teaching and learning in schools
Teachers and ICT   The effects of ICT on students' learning outcomes in
Key messages for innovation policies in education The potential of technology-supported learning
Introduction Examples of technology-supported pedagogical models Online resources for schools and self-directed learning   Key messages for innovation policies in education
Markets and innovation in the education industry   Introduction Size and structure of the education resource industry   The innovation role of market leaders Improving the knowledge base
Implications for policy makers   Key messages for innovation policies in education
Notes Business-driven innovation in education Afirst look at innovation in education
Patents in educational and instructional technologies Comparing innovation, reform and change
Professionals in highly innovative workplaces, by sector and innovation type Professionals in highly innovative workplaces, by sector and country Education professionals working in highly innovative workplaces,   by education level Overall composite education innovation index, 2000-11
Critical skills forthemost innovative jobs Thediffusion of selected online activities among Internet users, Internet users by age, Change in Internet access athome, Internet use among year-old students at school and outside school Percentage of students who reported engaging in each Internet activity
atleast once aweek Access tocomputers athome and students' socio-economic status
Common computer leisure activities outside of school, by students'
socio-economic status Problem-solving proficiency in technology-rich environments among adults
. . Problem-solving proficiency, by educational attainment

Problem-solving proficiency among younger and older adults
Labour force participation, by problem-solving proficiency using ICT ercentage of workers who use acomputer at
work ercentage of individuals who judge their computer skills would be sufficient
if they were toapply for

Calculation dimensioning






Ac to dc
power supply
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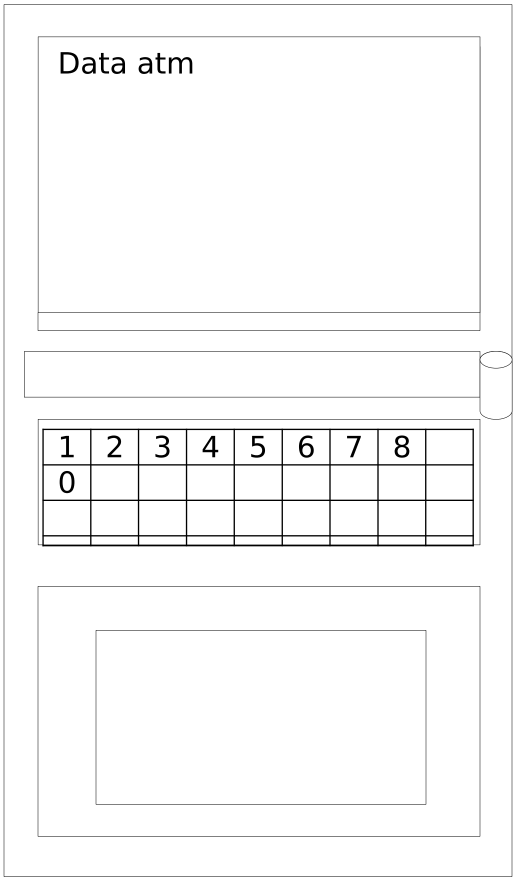
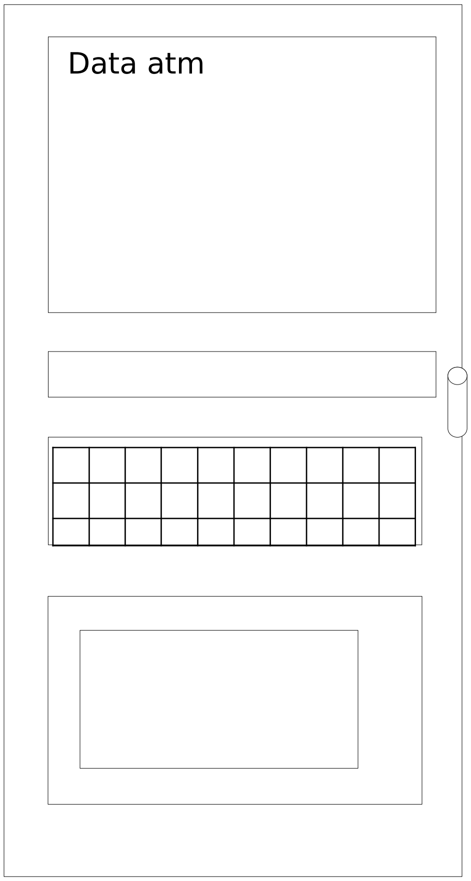
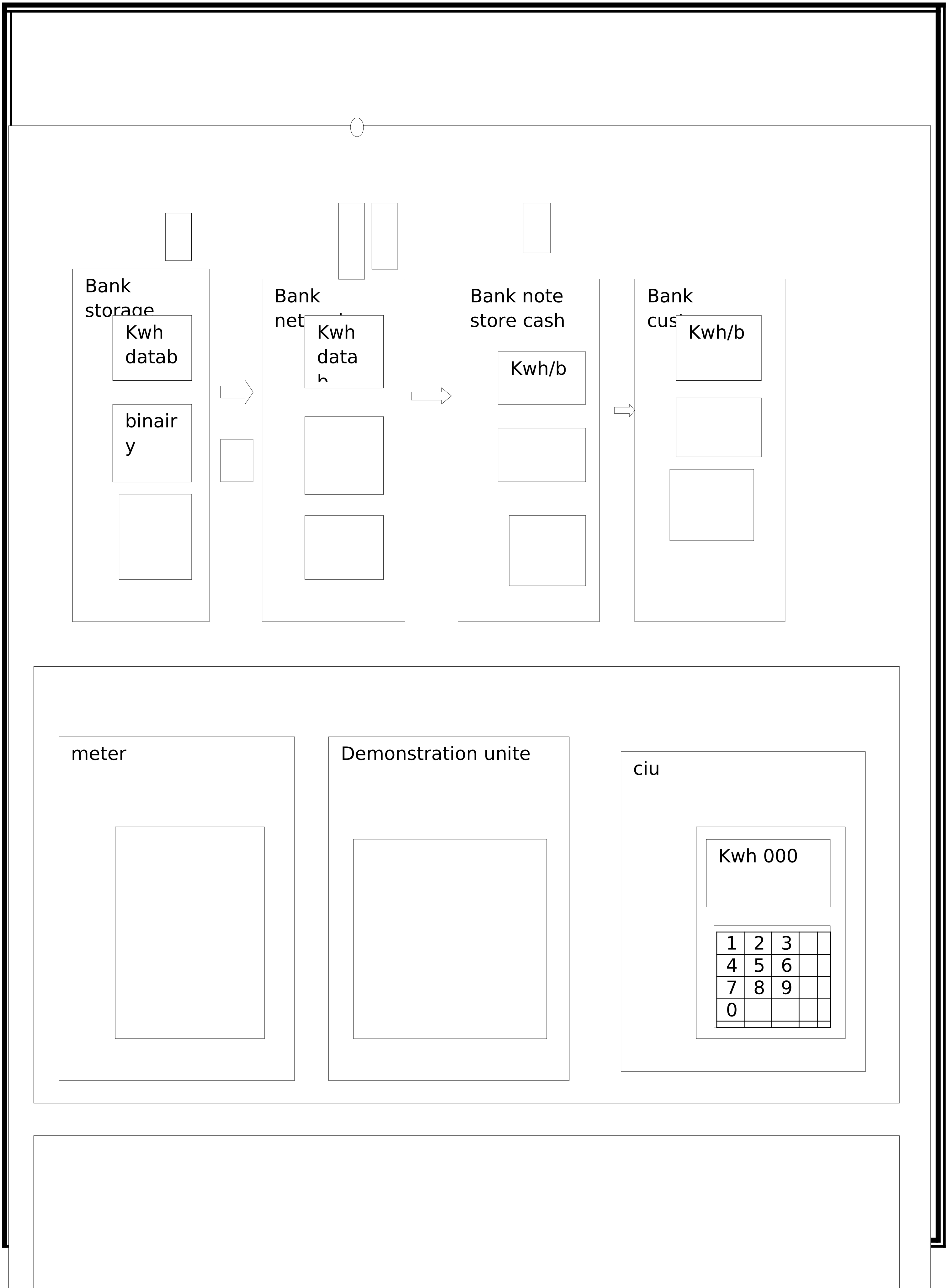
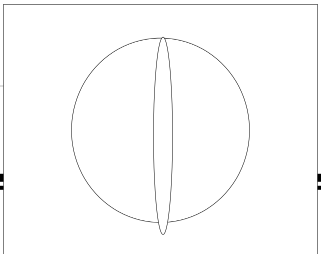

Data atm
1 2 3 4 5 6 7 8
0


Data atm


Bank storage
Kwh datab
binair y
Bank net
Kwh data b
Bank note store cash
Kwh/b
Bank cus
Kwh/b
meter
Demonstration unite
ciu
Kwh 000
1 2 3
4 5 6
7 8 9
0

30 requireded: design analysis engineering science energy, engineering chemical, engineering physics biophysics ,science electrical energy

low of conservation of energy, energy mechanical energy (KE+PE).non conservation energie mechanical.
KEi+PEi+Wnc+OEi=KEf+PEf+OEF..
-kinetic energy is KE, work . conservation ,PE work done by non conservation force is Wnc , energie are included as OE equation .
-Problem solving strategies ,step 2,determ the system ,step potential energie , conservation equation, KE1+PEi=KEf+PEf..
Step 4 if you know ,
KEi+PEi+Wnc+OE1=Kef+PEi+OEf,,
-Energy of variouse object and phenomena.
Object phenomenon / energy ING
1ton TNT /4,2×12.10.10.10.10.
-single electron TV beam TV /4.0×10. 10 exp -15.
Energy to break ..
- efficiency: eff = useful energy or work output/total energy input ..
Wout/Eint=
-efficiency of mechanical device and activities coal fire power plant 40%, of the chemical energy in the become usel electrical energy.
60% transformer per phase less useful energy form.
-thermique energy gaz.
Mechanical device efficiency of the human body and mechanical device.



-activity device /efficiency %
Steam engine turbine generator/ 17
Gasoline engines/30
Nuclear power plan /35
Compact fluorescent ligth/20
Gas heater cresid /90
Solar cells/10.
Weight fiting .
-action summary low conservation of energy state that energy is process energy change form.transferred from on system Tom
--when all form energy consider.
$KE+PEi+Wnc+CEi=KEf+PEF+PEf+OEf$...
$Eff=Wout/Ein$
-Seleted solutions to problem 1,4×10 exp4..
Equation ΔPEg and ΔKE..
Obtain.
$v=\sqrt{2gh+vo.vo}=\sqrt{2(9,80m/s.s\times(20.0)+15m/s/)}=24,/s$..
4.(a)..24x

Transformation...
$F=ma,+mg$..
$h=m.c.\Delta t$..

Hydraulic hrauelectric turbine conservation water ..thermique metering steam meter cube, ..

Linearity.
$KE=1/2.m.v.v$ kinetic energy kinetic
calculating..kinetic calcul.
$KE= O,5(30.0kg)x(0,500)$
$KE=3,75kg..m.m =3,75$..
$\Delta P.E$ to $\Delta .pE=m.g.h$..
$-\Delta u.p$
$KEi+PE=KFf+REf$..
Transformation energy chemito thermolonger

30.requirement : research industry.and research energy ,,electrical energy electrotechnolgy electromechanic.
Vibration , stability structure
Stability hyperstatic hypostatic pound noued construction stable finuculaire bridge life cycle ,
Instability Structure energy.electrotechnical.
Phenomenon,control logic.system
Plant engineering electrical science . components campagny design load.

-vibration structure hydraulic pneumatic
Transmission automatic vacuum regulation structure stable stress, indicator logging fault
Mass spring force oscillator .
...$MX''+CX''+kx=f(t)$.
F(t)non zero setup.m is mass c is friction k ,is the springs constant f(t)..Fourie series . periodic functions k,is the springs constant ,f(t).. Fourie series period function ,$f(t)=Fo\times\cos(wt)$..
$XC=C1.Cos(wot)+C2.\sin(wot)$...
$Wo=\sqrt{K/m}$ naturel frequency system oscillating,$Xp=A.\cos.(wt)$..
$x=co.\cos(wot-y.y)+Fo/m(wo.w0-w.w)$

-0,5x"+8x=10(cosπ)..x(o)=O, x(o)=o
W=π. Wo=√8/0,5=4. ,Fo=10,m=o,5 ,,
x=C1cos(4t)+c2sin(4t)+20/16-π.π..cosπ.t
-C1=-20/16-π.π..., C2=0,.
X=20/16-π.π..(cos(π.t)-cos(4t)..
-
2.sin(A-B/2).Sin(A+B/2)=cosB-cos ,,
X=20/16-π.π..(2sin(4-π/2).sin (4+π/2.t))
-
XP=At cos(wt)+B+sin(wt).tcos(wt)
-practical resonance.
- w=√w.w-2p.2p...or...x=XC+XP=Xtr+xsp
-coupling factor Piezo electrique.
KP=√25.(fn-fn).fn-fm/fn..

-frequency constant -Nt/No/NL.
Mp
-capacitance - CX (nf):
- static displacement .um...
-static voltage -v .
Resonance frequency Fr (khz).
Dielectric ..
APC material relative dielectric constant KT , dielectric dissipation Curie point c,
-electromechanical coupling factor..
Piezo electric voltage constant 1000vm/ ,young module, titanium,zirconium,quar
,note navy industrial
2×9-11Vac/mil for 840,841,VDc,at khz low field .
-maximum operating temperature
= Curie point 2.standard electric,capacitance+-20%.d33value +20%, frequency-

-**30.1..robot dynamic , kinematics and control: .calculation dimensionnin**
-nomenclature ,operator kinematics, introduction, position ,representation
coordination,cylindrical,co-ordinate,linear velocity,representation of linear
velocity ,Cartesian ,rotation matrics ,active,passive rotation,passive rotation eler
rotation,representation Euler angles ,axis unit quartersian ,
-angular velocity :
Time derivative of rotation parameter
Time derivative of Euler angles z,x,y
Time derivative of Euler angles x,y,z
Time derivative of Euler angles y,x,z
-generality co-ordinate,
task -space coordinator.
Dynamic classic mechanic .
-Matlab caD..
Operator
-a×b=[a1.a2.a3]×[b1,b2,b3,]=[a]×[b]=[o,a3,a2. -a3,0,a1..a2,a1,o] .[b1.b2.b3.]

Labaled 3d

X(pz=(B¶,z).. Ar=(pcosπ. Psinp)..
Linear vector..
AwB=ER(xR)..XP..
.
--rigid body velocity and acceleration..
Task space co-ordinate corresponding effector manipulator ..
Scarab robot arme..q=(&.B&.$)..

Labaled
-find the forward kinematics for a planar 3 DoF robot arm generalized coordinat
..q=(q1,q2,q3).=(&1,&,&3)
And effector position and orientatator.

X€(q)=(x€p(q),x€R(q))..
(X,,€R(q)=(x,z)=(i.isin(q)+l2sin(q1+q2)+I3sin(q1+q2+q3,
Io+I11cos(q1)+I2 cos(q1+q2)+I3 cos (q1+q2+q3)
X€R(q)=X€R(q)=q1+q2+q3...

Programme intelligence artificial..
System robot language machine data

-function : ph get + elu angx z,z from rotation matrix (c)...
% GETEULANGXJZ. Promotion matric (c) extract x.y.z.euler angle frame.
%rotation matrices .
% author ().
X=atan 2(-c(2,3), c(3,3);
Y=atan 2(-c(1,2),c(1,1));
Ph=[x y z];

30.2 requireded: industrial research means planned, research criteal inovation,grow equity component campagny appliance STI stick report equity equipment ,input executive,summary project manufacture
Trade report quality consumer.appliance.
Fridge.tv.stove,ion ketle stick proliferation report project manufacture.report diesels energy metering quality manufacture dtic marketing...
Industrial research high quality components.

30.requirement : research industry.and research
energy ,,electrical energy ele

32 requireded: total Change in energy of system
-ΔU= final poten energy , initial potential energy, ΔU=-IΔ×t×V
-(=Δq/Δt)..
Total kinetics energy of the system low conservation,
u= kinetic energy, kinetic energy=I××Δt
Conductor in electric field gradual energy , collision the charge total charges vibration of atome
Conductor heat energy Conductor, P=E/t.
-energy (e) ability to a working done=energy spent power (p)
-meant ..dp./dt . .d / DT (m.v)
Solve equations ...
L.di/DT +R.t.=E 'cosw.t...
dE.dt=0 .. demonstrating pendulum force..energy pandulum U=m.g.h
--dE/DT=-&L/&t. Partial derive l.partial time..
£=P.atct .. forcing function constant t
=Rtcy and forcing function is f(y) {CTD , second order differential ,x(t) , velocity acceleration ,,,DX/DT
..y(t),=Cewt+De-wt

-advanced measurements approach methods ,topics energy measure , discretion verification:
advanced and complex energy systems monitoring and control KPI based on integration of the active
power apparent power active .
--power average.
Pave=Δw/Δt.. instaneouse.
P=dw/DT..rate of work .
W= PΔ.t power during interval varies
W=int. p.dt work transformer...
P=dw/DT =F vect.×dr/DT= F×(dr vect/DT)
=F vect.×v vect....
--dw=F vect.dr vect=|Fvec||drvec|×cosπ ..
WAB= int f vect .dr ..
Wfr=-f Ind k k..
W Grove AB=-mg (yB-yA)...
W.spring A.B=((-1/2k)(x.xB- exp..
)...

P=dw/DT..... P=dE/DT..
W=int п -п[p.dt

- requireded supplies: engineering electrical energy
how to calculate voltage regulation of distribution line.
- introduction to voltage regulation .
-voltage regulation for 22kv,22kv,33kv overhead,.
-permissible voltage regulation .
Voltage regulation value requireded size capacitor .
-voltage regulation for 11kv22kv,33kv overhead line % voltage regulation.
=(1,06×P×L×Pf)/(LDF×RC×DF)
P -total power in KVA,
L-total length of line from power sending to power receiving in km
-pf- power factor , RC regulation constant (kva-km) per 1% drop , RC= (KVA.kv×10)/(Rcos$+xsin$)..
LDF=load distribution fonction.
LDF=2 for uniformly distributed load on feeder ,LDF >2 If load is skewed toward the power toward the power transfo
-maximum voltage regulation at any paint..
Part of distribution system,urban area %,sburba%,
-up to transfo ,2,5. 2,6
-up to service drop ,0,5!
- voltage regulation values voltage variation in 33kv and 11kv feeder limit,
-above 33kv (-) 12,5% to (+) 10%
-up to 33kv (-) 9,0% to (+) 6,0%
- in case is difficulties to achieve the desired voltage rural then ,11,10,433kv..
Distribution transfo place 1110,4..
Requireded and size of capacitor:
Cos$,to cos $2.
- optimum location of capacitor,L=[1-[KVARC/2KVARl)×(2n-1).
L- distance in per unit a long the line from sub station varc ,size of capacitor bank sub total
Voltage rise due to capacitor installation %voltage rise=(kvar(cap)×LxX)/10xv×2.Kva cos capacitor reactance per phase.,l length of line mile ,v phase to phase voltage in calculate% voltage regulation of distribution line ,calculate drop and % voltage trail and of 11kv distribution system.
System have acts dog Conductor (A16/472,G7/1,57)
- current capacity of acsr,
conductor=2050Amp
Resistance=0,2793, reactance=oohm..
Permissible limit of % voltage regulation at trail ..load b
Methods base voltage drop=((√3(Rcos$+Sin$)×1)/(Noof conductor phase x 1000))×lngth of line.
Voltage drop at load A,load current at point A(1)=KW/1,732×volt×pf.
-load current at point
A(1)=1500/1,732X1100x0,8=98amp..
-required no of Conductor ,
2phase =98/205=0,47...
Am =1No
-voltage drop at point.
A=((√3x(Rcos$+xsin$))x no of Conductor phase x 100))×length of line
Voltage drop at point .
A=((1,732x(0,272xo,8+0xo,6)×98×1×1000)×1500)=57volt..
Received and voltage drops=(1100-57)=10943 volt voltage regulator point A= sending volt receiving end volt)×100% voltage regulation at point A (11000-10943)/(20943)×100=o,5

32. Requireded: load current at point B(I)=kW/1,732x volt xpd.
-load current are point B(I)=
1800/1,732×1000×0,8=118Am
-distance from sources=
1500+1800{=3300mwter.
Voltage drop at point B=(√3×(Rcos$+sin$)×1/no of Conductor / phase × 1000)×length of line .

-voltage drop at point B =
((1,732×0,272×0,272×0,8+0×0,6)×98/1×1000)×3300=266volt.
Received end voltage at point B= sending end voltage drop =(1100-266)=10734. %
voltage reg at point .
B=.((Sending and volt - received

B=(11000-10737)110734)×100=2,48

-voltage drop at load cload curent at point cc kW 1,73x volt xpd ..
Load current at point c((I) 200/1,732×1000×0,8=13 amp .
Distance from sources.
1500+1800+2000=5300 metre .
√3(Rcos$+sin$)×1/(No of conductor length of line.
-voltage drop at point.
C=((1,732÷(0,272×0,8÷0,6)×98)11×100)×5300=269volt.
- receing and voltage at point .
C=sending end volt-voltage .
Drop =(1100-269)=1073 voltage regulation at point ,c= sending end volt-voltage
receiving en volt at point =
((11000-1073)/10731)×100=2,51%
Interpretation design single line diagram SLD complex projects..
-Mathematics mean power
Harmonic H..mean H=M1(a,b),
Geometry mean G=Mo(a,b)
arithmetic mean a A=M1(a,b)..
Minimum..
M.inf (X1.....xn)=Lim mp (X1...
X)..
Harmonic mean
M-1(X1.....xn=n/1/x...+1/xn
Geometry
Mo(x1...
Xn)=Lim .mp (X1....XP)
...p>O
M-1(X1....xn)=X1+....
Xn/n
M2(X1...xn)=√x1.x2+..xn.xn/n
Cubic mean
M3(X1....xn=3√x1,X1,X1+.....x1.xn./3..
Maximum
M+ inf (X1....xn)=Lim mp(px..

.. single axis arm designed with an ultrasonic motor basic active /passive torque control
- basic servosytem.
Control mechatronics energy.
T(k)=KP[¢d-¢(k)]
Servosytem manipulation , binairy , servomotor angle calculation .
Servo microsecond stage .
Priority encode logic ..

to

34.required engineering electrical faculty

Patronage.
Engineering construction electrical :
Construction principle electrical theory learn . association constructor automobile ,nor vde

constructor electrogenmotor
Panel wiring control electrical ,mechatronics , building electrical design installation.
Plaque signal number constructor Manuel hand book previous building plan architecture: building components
Schematic geometric architecture electrical electronics code norm ..
Construct power factor material .heater temperature line load .. inspection find fault rules installation building
License building infrastructure electric municipality planning..
--trade electric engineering manufacturing theory design trading
Workshop workplace component construction skill in job material inspection employee creation engineering architecture.mode emploie operationel basic advanced job applied energy inspection trading relate court low ..trade test certificate licence trade theory job low rules

-engineering electrique foundamental system process low studies integrite analysis investigation design device integrity subject trade and science engineering.electrical engineering analysis component need work fundamental assistance study calcule council association job government. Summary study case trade Nated and infacture constructor creation subject energy career generation power station, electrotechnolgy.mathematic.science

- requireded: electrotechnic ,electrotechnolgy ,technology electrique,schemat electric,
Generalite Sur un appareillage , introduction , fonction de l 'appareillage ,
Le sectionnnemt ,la command, protection, classification de l'appareil,choix l 'appareillage, caracteristique technique d'un appareillage electrique , tension assigned d'emplloie,(UE), tension assigned de d 'isolement (UI),tension assigned de tenue aux choice uin ,
Courent thermique convention ,l air (lth),courant assigned d 'emploie, pouvoire assigned de Ferme, pouvoire assigne de Ferme, pouvoire,assigner de coupure,durability electrique, protection de l'appareillage ,indice de protection IP ,indice de protection IP,indice de protection ok ,class des material electrique,

-

to

01 Engineering electrical deal science electric electrotastic creation system fundamental electromagnetic power station substation field movement electrostatic dynamic networks nated diplomat n saqa generator transmitted.
-electromechanical application deal technique electrical EIC commission, specifical diplomat symbol circuit power station substation electrotech commission.
-constructor electric deal building electric deal building electric support architecture support.architecture diploma line vector saqa component.
--trade electrical deal diploma workplace worstand certificate power station compagny trade basic.
-tradel labour skill electrical workshop place.
-engineering electrical Nated Isat integrite trade skill power station subject magnetic workplace theory diplomat .
-professional development.
Engineering electrical electrical lab work shop mettering amp wat volt Ave machine power station Consultant calcuation kWh,metering power station substation conception.
-electrodynamic,charge electrostatic kWh index take by electrical technology,
Calcul , U.I.sin t

Amplitude cinematic charge move electromagnetic reactance.
Engineering electrical trade metering components electrodynamic work.creation electrostatic theory engineering point fixing installation infracturevinfracture
Db box

Diplomat evaluation career total license certificate national trade

LOCATION: Division: Technology Management Services: (Pretoria)

REFERENCES: TMS 36/2019 (1 post)

Generic Requirements:

- Applicants must display competency in the post-specific functions of the post;
- Be in possession of a Senior Certificate (Grade 12),
- Be a SA Citizen,
- Be fluent in at least two official languages, of which one must be English;
- Be in possession of a valid light motor vehicle driver's licence. Must have no visible tattoo/s when wearing summer uniform.
- Must have no previous convictions or pending criminal/ departmental cases pending.
- Applicants will be subjected to a vetting process which will include security screening and fingerprint verification.
- Organizational skills. Computer literacy (MS Word, MS PowerPoint and MS Excel) will serve as an advantage.

Additional Requirements:

- An NQF 6 in Electrical Engineering or NQF 4 certificate or equivalent with minimum 2 years' experience in the field of post or National Technical Certificate level 3 (N3) in the field of Electrical Engineering light current / telecommunications (Electronics) with minimum 2 years' experience in the field of post or NQF 3 certificate with a minimum 5 years' experience in the field of the post.
- Having successfully completed the following courses Radio Installation, Frequency Modulation Principles and Basic Electronics (applicable to all applicants except applicants with NQF 6 in Electrical Engineering).
- Must be willing to work with heights.
- Trade Test in the field of the post and/or certificate in fall arrest / rope rigging will be an added advantage.

Core Functions:

- To conduct repairs, installation, removals and maintenance of radio equipment for the SAPS Radio Technical Unit.
- To do radio infrastructure installations at SAPS Radio High Sites.
- To conduct preventative maintenance at SAPS Radio High Sites.
- To work and perform operating test equipment (Communication Monitor, Signal Generator, Oscilloscope).
- To analyse and trace radio infrastructure faults.

GENERAL:

- Only the official application form (newly developed form is available from all police station, on the SAPS website www.saps.gov.za and at the SAPS Recruitment offices) will be accepted. All instructions on the application form must be adhered to and previous criminal convictions must be declared; failure to do so may result in the rejection of the application. The post particulars and reference number of the post must be correctly specified on the application form.
- Persons who retired from the Public Service by taking a severance package, early retirement or for medical reasons, as well as persons with previous convictions, are excluded.
- Comprehensive Curriculum Vitae must be submitted together with the application form.
- Certified copies of an applicant ID document, valid motor vehicle driver's license and all educational qualification obtained must submitted together with the application form

Bid invitation receiving OTENTIAL SERVICE PROVIDERS ARE ENCOURAGED TO USE THE INDICATED URL LINK FOR THE DOWNLOAD & PRINTING OF SOUTH AFRICAN POLICE SERVICE PDF TENDER DOCUMENTS -

http://www.etenders.gov.za/content/advertised-tenders/ **note contractor acceptance e saps scm /maintenance**

Contract nr	**Description**	**Published date**	**Closure date (@11:00)**	**Bid Document**	**Yes/not**		
	APPROVAL OF SERVICE OF AN APPROVED INSPECTION AUTHORITY (AIA) TO PERFORM OCCUPATIONAL EXPOSURE LEVEL SURVRY IN TERMS OF THE						

	OCCUOATIONAL HEALTH AND SAFETY ACT 85 OF 1993 AT THE DIVISION: DETECTIVE AND FORENSIC SERVICES FOR COMPONENTS: CRIMINAL RECORD AND CRIME SCENE MANAGEMENT AND FORENSIC SCIENCE LABORATORY NATIONALLY FOR A PERIOD OF THREE(3) YEARS						
	Contract data						
	service, Maintenance and Repairs - The successful Bidder shall carry out five (5) and six (6) monthly services for the contract period. Thirty						

department of science and innovation socio economic development,

-**1 .programme administration technology innovation international cooperation**
Gov , city power and St peace college
Programme, exposition science

-2.programme research development support :
St peace college lecture and learner development under planning. Department high Education vs saqa vs qcto,vs seta research resolved time table examination Assessment police , Portfolio documents systems integrity police academic,

-**2.1. Purpose: innovation practical and theoretical. science and technology science national** trade factor outcome time table trading examination and qualifition framework national diploma n engineering and council trade sector authority , innovation system outcomes empower system subject entry phase learning and lecture teach science exhibition generation technology Assessment police ,and Engineering assessment trade machine and trade control system process project system control evaluation system

2.1.2 knowledge: innovation practical and theoretical trade technology electrical engineering Electrotechnolgy empower value are recreation orientation maximum, value tax , return studies and
Examine electro technology engineering time table assessment
Completed research laniaries system technology value entry lecture exam nated vs. saqa vs qcto linearism system electro technology power fundamental job duty job maximum, job value minimum trade operational, task minim component system,
-Job duty cycle system value : learner lecture framework qualifition and occupation trade job value salary resource human maximum fiscality minimum technology components system : sciences natural system investigation design minimum agreement value job trade module,task minimum ,task minimum

service require trading sectors and maximum sectoral electrotechnology trading components
Value financial tax system:

2.2.3: strategies: strategies phasing module tasking curriculum system implantation levels grading lecture

objectivity:
The trading lecture and learning system engineering science electrical subject and technology electrical ,electro technology ,education technology
System outcome , trading education technology systems power factor demand system education , efficiency system assignment power objectivity module task , maximize inventories psychopedagogie metric system month week of observations learner form test assessment assignment control tpm maintence meeting product control technology goal .

-**1.2.3.4: development humain generation: system teaches sector organisations technology rate value maximum ra**te demand factor admnise value ask required report system value.
-**1.2.5.component: trading lecture used company manufacture relate system Industrial Education system** intelligence management system information ,education computing control system switch and material support command disposition component manufacturers
Numerical time table framework regulatory Education trade relate handbook guideline information and orientation integrative system component handbook relate maintenance update , upgrade system
-**1.2.6: basic science infrastructure: implantation of research innovation mission equipment College equipment framework theory practical lab workshop** workplace implantation department gov system ,more

Inovation,tax incentives,,
Meeting request

-**National energie regulatory of South Africa mandatory electricity piped , invitation me minister tribunal**,,

Meeting electrical conformance board design installer regulatority Cox competition b

Meeting salt .dmrg stick ,sale revenue power plant fuel used national treasure sars department of energy mandatory ensure private sector participr in power generation ,
Meet national skill fund,, national research fund ,,
Visa permit

Learner Name (s): __tshingombe tshitadi_________________________________ Grade(s): ______12/___, n6 _
School Name: __st peace collge ________________________
_Region: gauteng ________________________
Project Title: __the implementation framework circulum knowledge circulum policy engineering planing product improvement contractual agreement with register trainer and consultant engineering electrical and computer science engineering

1.abstract : the implementation framework circulum knowledge circulum policy engineering planing product improvement contractual agreement with register trainer and consultant engineering electrical and computer science engineering static material drawing need discovery Channel partner ways together with the quality plan on being there for system need system generated undergoing next year's and analyse to zero loadshedding or Rental system information recommand theory practice of anticipating dangers social media teach
the innovation define city power municipality government institutes city jhb delivery matter supply public and private urbanization energy electrical ,
And define Eskom entrepreneurs commission delivery society government industrial delivery public private energy electrical commissioner .
.the school and college institutes private public define by Education department teaching learner science engineering apprentice and training and assessment of learner intellectual
-need or problem defined : the research implementation problem need to resolve discovery rural and actually technology innovation industrial to integrate system to standard system knowledge support natural sciences design generated analyze combined sheet from school assessment Portfolio college career outcome Assessment information formative and Summative to workplace workshop mentoring components system to be improved or functionnning to the municipality and entrepreneurs industrial to promovate graduation in workplace.
-research questions:

Ask factor job career outcome transition phase learner phase exhibition phase teach beginning, intermediate,seignor get college junior cadet minim functions graduate chief post generation size industrial , development outcome machine industrial problem industrial maintenance support, manufacture support technical science actual system machine computer system news technology robot science energies need career outcome integration human and material support to resolve demand factor in humans size outcome tendered bid and material resource capacity product integration. to resolve team timeframe operational system month daily diary

2.Purpose: **Ask factor job career outcome transition phase learner phase exhibition phase teach beginning, intermediate**,seignor get college junior cadet minim functions graduate chief post generation size industrial , development outcome machine industrial problem industrial maintenance support, manufacture support technical science actual system machine computer system news technology robot science energies need career outcome integration human and material support to resolve demand factor in humans size outcome tendered bid and material resource capacity product integration. to resolve team timeframe operational system month daily diary ,
-research time frame :

Project ,importance time frame allocation time table research engineering and science electrical implementation break time load shedding time industrial loss gain resource human material energetic ,time table adaptation system team synchronization, asynchronous system regulation time table periodic alternative or direction energy production system cost metering production human time frame to resolve movement frequency response of team step task project in the structure, resonance learner ,metering learner teacher, resonance learner and system robot actually must be synchronized s

3.Method :

METHOD:

MATERIAL AND EQUIPMENT:

methology specific guidelines assessment formative Summative rebruc,tools assessment learner and teacher ,time table allocation file student file school..workers file employment database file training job and emploie job , humain.
Material stationery information Manuel and automatically system machine laptop computer ,panel system ,design,execise book log book, journal account book, drawing sheet book,office documents wallet book,bank card register office database employment book, need,
Engineering electrical material,panel projection permit office workplace register government industrial register social,policy defense security register logistics support, space power.
Electrical generation transmission,distribution metering measure tools ,robot it system Port USB , Panel, equipment scaling.office study.

4.Results: **nano technology and mining , wath is natechnology , wath are the danger of mining,how is nanotechnology being used to make safe , activity,2,3 ..**
-nanotechnology and energyb,where does ours energy come from,non renewable and renewable energy source ,how can nanotechnology help to build better solar panel , activities,1,2,3:..
.nanometre..
- the are used nano technology science very small ,object ,,..
..
..discy, ..
- apparatus , investigation, write an investigation Questions, write a hypotese for your investigation, procedure for the investigation ..make sure that your hypotheses give a clear idea of step you need ,
- connect your equipment so that you have build circuit shown diagram, beginning by including as completed the circuit observe brightness of the ligthbub, now,observe the brightness of the ligthbub with this shorter length,, torch ,wire pencil lead,wire,, now decrease the length pencil lead that has been included in your circuit once , observe the brigth of the ligthbub with this shorter length of pencil lead ,record your observations,
-analyse your data. Assume the brigthness current and resistance do you notice from observations,
-Write a conclusion.
Write a clear conclusion to your investigate..
Activity:
Describe the mining danger ,,
-activity : in group of 5 ,6 learner design and draw a poster showing how nanotechnology is being used to build gas sensors for mines,
- make your poster as clear and colourful as , .
- you teach will assess your using criteria.

- poster is colour and creative , 2 marks,poster shows original idea 2 marks, poster is clearly presented , 2 marks,information on poster is informative. 2
.

5. Conclusion : **Engineering it... discovery Computer , training , development and support services to existing or prospective , club house safe creative space to learner aged ,prepares learners for full participation** in the 4IR and provide exposure to coding ,robotics ,sebt development, graphic design,3 d design ,2 D and 3 D modelling, animation,video production, basic computing , virtual art , year full time development program 180 unemployment youth aged training including cisco,it Ccma ,ccna security Linux,IoT ,C,C++ , python , essential skills and career readiness, instructor training centre essential ,ccna routing and switching ,ccna security ,ccna cybersecurity operation,to existing or prospective , custome accreditation custome 3,_4 day module ,word,excell,access,Nd power point ms office,speciistr training,it also digital literacy, skills, certiport examination ms office , specifical, delivery fundiy depending learner full standard ,..

University. Undergraduate, how do you conscientise students about 4 in their learning ,reality ,Google self driviy,
- what about the research output research , ..where are you going create new facility .
- complementary roles engineer, design inovate ..role in perspective,
, Career psychological services focus counseling therapy psych education ,career resource ,CV job interview gradust,

Eskom Expo for Young Scientists
RESEARCH PLAN

1. Research Plan Templates for:

   1.1. Scientific Investigations Projects/Experiments

   1.2. Engineering Type Projects and Computer Science Projects

   - For these types of projects,

- a design process is followed according to criteria, to build and test-redesign-retest a prototype/product/solution e.g. a device or a computer code

1.3. Social Sciences Projects

- Social Sciences research involves an objective and systematic method of exploring and analysing human behaviour, social issues and other phenomena. It involves collecting qualitative and/or quantitative data

1.4. Mathematics/Theoretical Projects

- Mathematics projects explore quantity, structure, space and change. Starting with an observation, problem or question, make conjectures/hypotheses, prove your claim using new or existing methods, make valid deductions and test your ideas theoretically. Your reasoning and arguments must be logical

.2.2 SCIENTIFIC INVESTIGATIONS/EXPERIMENTS

NAME:_tshingombe tshitadi____

PROVISIONAL PROJECT TOPIC:____

PROVISIONAL EXPO CATEGORY:____

- NAME : TSHINGOMBE TSHITADI

-PROVISIONAL PROJECT TOPIC: IMPLEMENTATION FRAMEWORK POLICY COLLEGE AND SCHOOL ENGINEERING CIRCULAR ASSESSMENT POLICE EDUCATION TECHNOLOGY TEACH AND TECHNOLOGY ELECTRICAL SUBJECT SCHOOL QUALIFICATION LEVEL IN ENTREPRERSHIP AND INDUSTRIE SOCIETY COMMISSIONING AND GOVERNMENT MUNICIPALITY TEAM TRAINING WORK GRADUATION ENGINEERING TIMEFRAME .ST PEACE COLLEGE SCHOOL ORIENTATION GUIDE MANUEL POLICY

-PROVISIONAL PROJECT EXPO CATEGORY..:

- INTRODUCTION:

2.3 Introduction

2.3.4 Literature review:

?Define concepts/definitions

.What are the benefits/significance of doing this research/who will benefit?

2.3.4 Problem Statement: What problem/issue will you be addressing?

2.2.5 Research question(s):).
Aim: What is the aim/objective of this research project?

2.2.6 Hypothesis:
Variables: List the independent, dependent and the controlled/fixed variables

2.2.7. Method

Materials
Procedurend record the data?
Data analysis: How will you analyse the data?

Ethics
Safety
Time Frames

2.2.8 References

.

Teacher's/Mentor's comments and suggestions:

Teacher's/Mentor's name, signature and date:

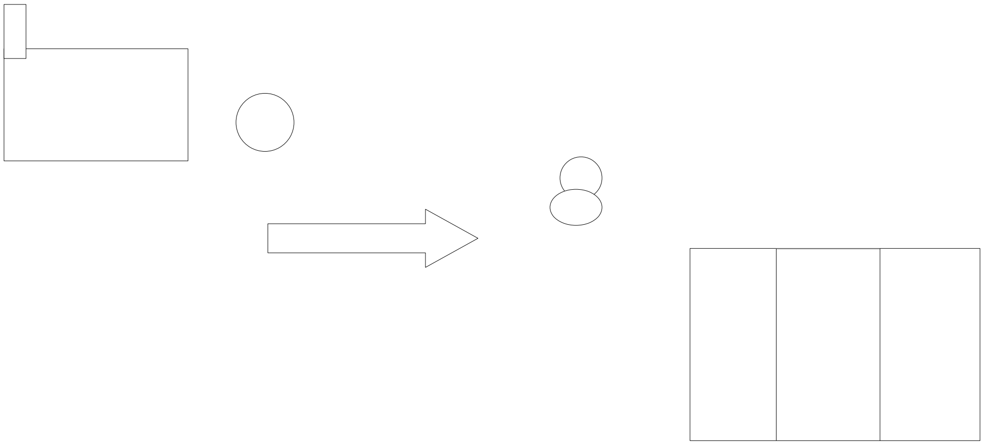
ENGINEERING TYPE/COMPUTER SCIENCE PROJECTS

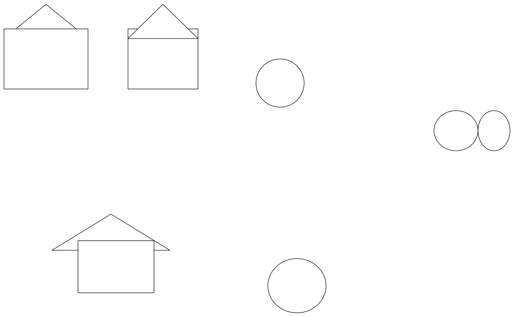
NAME: __________tshingombe
____

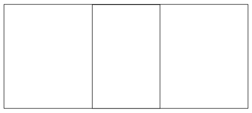
PROVISIONAL PROJECT TOPIC: ____
PROVISIONAL EXPO CATEGORY: ____
- NAME : TSHINGOMBE TSHITADI

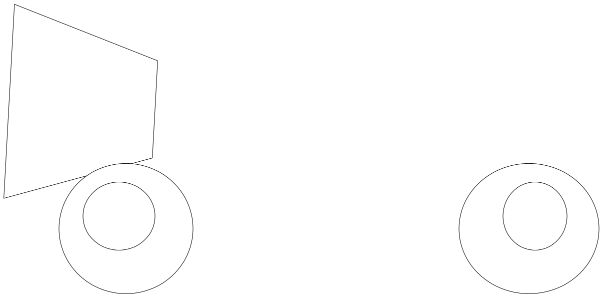
-PROVISIONAL PROJECT TOPIC: IMPLEMENTATION FRAMEWORK POLICY COLLEGE AND SCHOOL ENGINEERING CIRCULAR ASSESSMENT POLICE EDUCATION TECHNOLOGY TEACH AND TECHNOLOGY ELECTRICAL SUBJECT SCHOOL QUALIFICATION LEVEL IN ENTREPRERSHIP AND INDUSTRIE SOCIETY COMMISSIONING AND GOVERNMENT MUNICIPALITY TEAM TRAINING WORK GRADUATION ENGINEERING TIMEFRAME .ST PEACE COLLEGE SCHOOL ORIENTATION GUIDE MANUEL POLICY
-PROVISIONAL PROJECT EXPO CATEGORY..:
- INTRODUCTION:

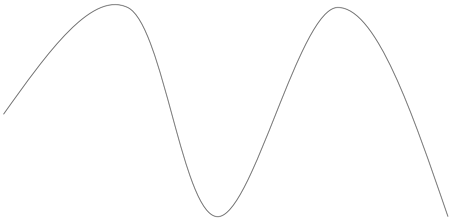
Interview ask











1**.RESEARCH PLAN:**
- ENGINEERING TYPE,AND SCIENCE COMPUTER
- NAME : TSHINGOMBE TSHITADI

-PROVISIONAL PROJECT TOPIC: IMPLEMENTATION FRAMEWORK POLICY COLLEGE AND SCHOOL ENGINEERING CIRCULAR ASSESSMENT POLICE EDUCATION TECHNOLOGY TEACH AND TECHNOLOGY ELECTRICAL SUBJECT SCHOOL QUALIFICATION LEVEL IN ENTREPRERSHIP AND INDUSTRIE SOCIETY COMMISSIONING AND GOVERNMENT MUNICIPALITY TEAM TRAINING WORK GRADUATION ENGINEERING TIMEFRAME .ST PEACE COLLEGE SCHOOL ORIENTATION GUIDE MANUEL POLICY
-PROVISIONAL PROJECT EXPO CATEGORY..:
- INTRODUCTION:

the innovation define city power municipality government institutes city jhb delivery matter supply public and private urbanization energy electrical ,
And define Eskom entrepreneurs commission delivery society government industrial delivery public private energy electrical commissioner .
.the school and college institutes private public define by Education department teaching learner science engineering apprentice and training and assessment of learner intellectual
-need or problem defined : the research implementation problem need to resolve discovery rural and actually technology innovation industrial to integrate system to standard system knowledge support natural sciences design generated analyze combined sheet from school assessment Portfolio college career outcome Assessment information formative and Summative to workplace workshop mentoring components system to be improved or functionnning to the municipality and entrepreneurs industrial to promovate graduation in workplace.
-research questions:
Ask factor job career outcome transition phase learner phase exhibition phase teach beginning,

intermediate,seignor get college junior cadet minim functions graduate chief post generation size industrial , development outcome machine industrial problem industrial maintenance support, manufacture support technical science actual system machine computer system news technology robot science energies need career outcome integration human and material support to resolve demand factor in humans size outcome tendered bid and material resource capacity product integration. to resolve team timeframe operational system month daily diary ,
-research time frame :
Project ,importance time frame allocation time table research engineering and science electrical implementation break time load shedding time industrial loss gain resource human material energetic ,time table adaptation system team synchronization, asynchronous system regulation time table periodic alternative or direction energy production system cost metering production human time frame to resolve movement frequency response of team step task project in the structure, resonance learner ,metering learner teacher, resonance learner and system robot actually must be synchronized slot frequency, control loop wizard register access card system movement personal in out robot system entrepreneurs synchronization system. speed level up date need to control by human robot system technology.
-Aim : overview : in the review system career learner induction or error implementation framework regulatory mandatory learner human resource in time time frame must adjustable system and resolve registered system administration standard synchronization and stability adaptor system delay register , model rwin city ,wring commission adapted illegally institutes or college need to training system and adapted in system upgrade update register circular policy engineering planning,
-Engineering goals:
Design , facilities learner Engineering entry model ,years learner up date ,up grade years 2023 to 2018 in college up date and new institutes and news outcyactual tendered job city.
Class model grade 1 to grade 12 level n 1,6 college level , university level ,
N1 to n6, NQF 1,nqfto 3 qualifications framework n engineering, grade occupation certificate seignor council certificate Engineering, category, frequency term 1,2,3,4 semester move file Portofilio assessment student register Poe's docket case indicator job logine , compare scaling,compare ,comtency rating ,
Synchronous induction learner speed slot intellectual quotient learner entry exhibition, efficiency learner ,average,
Probability learner gate job integrity post learner Portofolio learner award learner , probably learner job equity engineering and electrician daily meeting.
More less .induction error proefficuence more ,
Goal close tendered minimum graduat learner posted salary recruitment post , maintenace poor,
,-algorith achieve , probably.
- METHOD:
MATERIAL AND EQUIPMENT:
methology specific guidelines assessment formative Summative rebruc,tools assessment learner and teacher ,time table allocation file student file school..workers file employment database file training job and emploie job , humain.
Material stationery information Manuel and automatically system machine laptop computer ,panel system ,design,execise book log book, journal account book, drawing sheet book,office documents wallet book,bank card register office database employment book, need,
Engineering electrical material,panel projection permit office workplace register government industrial register social,policy defense security register logistics support, space power.
Electrical generation transmission,distribution metering measure tools ,robot it system Port USB , Panel, equipment scaling.office study.

-PROCEDURE : description
Learner and teach , Education design technology support science ,and enysupport,
- team step task operation activities career,
Relate argument statement button
Operationel preliminary task.method motivation automation ,register system input output student workclass scaling class career class ,yes statement class yes, implementation print and yes , workplace Eskom or city power available learner place yes synchronisation or inspection department education or labour gov yes adapted system accountability yes restore file system yes , , relay delay yes compare yes test control loops system yes flip file equity and statement post yes, teach system yes up date course lecons activity yes compare resolution certificate yes occupation yes qualifications yes compare systeme, questions custome system ask resolve yes meet yes training ask component framework yes activate yes implementation yes system restore maintence support system,

Data systems collect and memorise award.
-ETHIC : completed safety.
Circulum policy framework regulatority,quality council trade council engineering, circulum policy, Education regulation regularity irregularite material fault default, insurance quality , Health injury or health time frame synchronisation,asynchronous learner , network transmission,generation distribution system synchrone,real time , images time frame safety,time frame framework stability learner , induction learner error learner outcom no meeting or learner gate damage system or break time table material stationery workplace college affect workplace industrial and municipality breakdown job injury body or robot system industrial registration move inactive receive message or not send or not incomplete,support no survey real no arrival place asynchronous

2.LITERATURE REVIEW

-time frame : project work plan
Plan orientation industrial and supervision.
. orientation industrial : schedule project shift days night
Management supervisor
Humain resource
Management system information
Legal practice

Date :
State,:
post :

- teacher ' mentor comment and suggestion:

-3. **ABSTRACT**: the implementation framework circulum knowledge circulum policy engineering planing product improvement contractual agreement with register trainer and consultant engineering electrical and computer science engineering static material drawing need discovery Channel partner ways together with the quality plan on being there for system need system generated undergoing next year's and analyse to zero loadshedding or Rental system information recommand theory practice of anticipating dangers social media teach,
-Name : tshingombe
- school name : St peace college.
- grade : 12/ level 6,n 6
Region Gauteng.
- PROJECT TITLE: IMPLEMENTATION
-ABSTRACT :
-PURPOSE:
-METHODE:.

-project management: building for scientific mentor, school,
- views school attending,
Project submitted.
- customer used.
- application award certificate .
Grade expose youth.
- project creating .
- school management projects
Development companies.
- social, science.
-agricuture animal, prody agriculture,
Biomedical chemistry analysis,
- computer data management data science network,St earth science , atmosphere ,climate science,energy, productivity, engineering, biomedical, engineering chemistry, math, algebraic ,plant sciy, physics, astronomy,science,matter,science ,matter ,optic,

-Types of project: scientific investigation: reseat questions and a hypotese, observations and ,
- it involves Colle ,
- engineering computer design , process , according,criteria,build test redesign,retest proto,

-mathrmatic, theoretical,
Print explot,
- quantity hypothy
- creative identify what.
- interest focus specii topic
- determy significant, value.
Topics literature review.
Creating ,ethic ,response research plan ,
Project book,
Take pictures.

2. Teacher mentor name

Teach engineering/ and Education technology.
News are Cree city and commission

Teach engineering youth
Reflections daily
Career mentor
-lesson plan:
-Nano technology and water
What is nanotechnology,
How small arbobject nano technology,
Where does our water come from ,
How can nanotechnology make safe to drink.
Activity 1,2,3 extension activity.

, -nano technology and mining , wath is natechnology , wath are the danger of mining,how is nanotechnology being used to make safe , activity,2,3 ..

-nanotechnology and energyb,where does ours energy come from,non renewable and renewable energy source ,how can nanotechnology help to build better solar panel , activities,1,2,3:..
.nanometre..
- the are used nano technology science very small ,object ,,..
..
..discy, ..
- apparatus , investigation, write an investigation Questions, write a hypotese for your investigation, procedure for the investigation ..make sure that your hypotheses give a clear idea of step you need ,
- connect your equipment so that you have build circuit shown diagram, beginning by including as completed the circuit observe brightness of the ligthbub, now,observe the brightness of the ligthbub with this shorter length,, torch ,wire pencil lead,wire,, now decrease the length pencil lead that has been included in your circuit once , observe the brigth of the ligthbub with this shorter length of pencil lead ,record your observations,
-analyse your data. Assume the brigthness current and resistance do you notice from observations,
-Write a conclusion.
Write a clear conclusion to your investigate..
Activity:
Describe the mining danger ,,
-activity : in group of 5 ,6 learner design and draw a poster showing how nanotechnology is being used to build gas sensors for mines,
- make your poster as clear and colourful as , .
- you teach will assess your using criteria.
- poster is colour and creative , 2 marks,poster shows original idea 2 marks, poster is clearly presented , 2 marks,information on poster is informative. 2 marks, group work learner were included 2marks ,total 10 marks.
2.how to build yourself a bright technical future.
- considering a technical career,..
- let s get down to work ,
- how do I pay for ..
Technical and artisanal not so low skilled job fact skilled,
Revolution age material age skill..
Myth and facts about technical careers .
Myth choosing a technical course will lead a low paying job , career regards status compare,gate stuck on your career ,technical career are not for women ,is dirth work,there is not room for creativity in technical career
Fact : a well qualified technicians or artisan is high demand and will earn good salary , need RSA job technical low, women do justas these career, workplace need clean
, Engineering challenge are practical problem and many need creation nthar where qualifirv,,
.are you fascinated by how something,piece make it up together,do you prefer to make things instead of reading aboutg ides ,doubyou enjoy solving puzzles and problem,does working in team make happy ,would you like to run your business ones day a career as artisan or technicia ,, mechanitechnique , electrical,civilengineering technologist
, Let see what you are good at , it can difficult to decide what your are good at what career you want doing is to use a theory designed, six broad type, realistic,investigative,artistic ,social,entreprise, conversation, occupation personel,
-Are you realistic,are you pracal, CA you fix electrical things,do like explore machine, wath score
-are you investigative , are inquisitive ,can you things abstractly, do you like to explore ides,,analytical solve math problem use computer wath score,
- are you artistic are you creative , sketch draw or paint all ,solve problem in original way, intituive ,use intutii.read stories,play and poetry,imagine,,are you social are you friend can you teach or train other,do like to use social or interpersonal,are you enterprises,are you self confidence,star project ,do you like to make that affect,
- so what now ,how do you get there ,
Registered Education institut NQF qualifications.
Career career Pathways, ,school need subject ,wath exactly the Engineering technology field ,electrical,career pet for part..
- birthday planetarium, science activity, ,erupting apples, planetarium show,science show, graphite circuit

Climbing wall package,
Subject in the national curriculum statement grade ,10-13..
Learning field ,elective subject, you need to have selected subject, subject refer to the ,
-comulsory subject ,home language n,first language,pure math ,
Human social studies ,physical computer, business comeerce managent ,service manufacture eny, design technology, electrical technology,eny graphics design,mecanic

Engineering it... discovery Computer , training , development and support services to existing or prospective , club house safe creative space to learner aged ,prepares learners for full participation in the 4IR and provide exposure to coding ,robotics ,sebt development, graphic design,3 d design ,2 D and 3 D modelling, animation,video production, basic computing , virtual art , year full time development program 180 unemployment youth aged training including cisco,it Ccma ,ccna security Linux,IoT ,C,C++ , python , essential skills and career readiness, instructor training centre essential ,ccna routing and switching ,ccna security ,ccna cybersecurity operation,to existing or prospective , custome accreditation custome 3,_4 day module ,word,excell,access,Nd power point ms office,speciistr training,it also digital literacy, skills, certiport examination ms office , specifical, delivery fundiy depending learner full standard ,..

University. Undergraduate, how do you conscientise students about 4 in their learning ,reality ,Googl e self driviy,
- what about the research output research , ..where are you going create new facility .
- complementary roles engineer, design inovate ..role in perspective,
, Career psychological services focus counseling therapy psych education ,career resource ,CV job interview gradust,

to

purpose: 3 ,,phase synchronous machine an electromechanic energy conversion device operate speed of rotating magnetic field , synchronous machine ,bases energy, synchronisation generator, , NS = 120f/ p , number of poles the machine ,
Work.principlr,
-key features, synchronous motor do not starting self , synchronous machine double excited machine because it requires two input supplies ones stator , synchronous machine,operate at constant speed, called , syncy generator can produce voltage magnitude ,machine lagging,leading unit, syncy motor voltage : equation of synchronous motor,
V =En+Is(Ra+jxs)., - v = voltage Police ,En back end , I a armature current ,Ra armature resit, resultant voltage difft between the voltage applied V,and back EMF, Internal angle, ER, and tan @= X's/Ra..,back EMF generated , En= ka.alpha,NS..
En=v normal excitation, logging power factor, input power : input power synchy motor is given pin = v.Ia.cos ,,,pin = √3.v.L.I cos ,where ,, .mechanic power in motor ,Pm=Eb.Ia.cos (a- alpha) ,,,Pm= Pin - Is.Ra..Pin= √3.VL.I.L cos ..is load angle.gross torque,synchry,speed , stepper motor ,B= Ns-Nr/NsxNr)*360..step angle of rotation ,ms = number of stator , resolution of stepper motor , , loady regulation= change output,no load , output volt,, fault calcule breaker busbare ,IB= , I/X's=1/x+1/x..
- Implementation and stability inspection, cycle of training ,step take long time
- psychomotor : and physical requirements of a job analysis survey rate the functionalite requirements of job rating class ,job analysis,process, resultat process , resultating primary resultat job session news , category data, work ,instruction , function,analyse ,PC to collect data and draw ,

construction job tools ,build task tools up data ,,
- function in the real world introduction student to function ,function machine, functionalite machine easy ngrap, machine input goes same thing happened rules ,input predict output determine the input, input , metaphor by setting large cardbox machine mystery rules ,teacher student can create rules teacher created spread sheet machine,,,,
-Synchronous system asynchronous effect .phase transition
Asynchron 3 space 90,120 , wave ,,
-understand the gradient function slope slip tangent point derivative ,vector function Probly calcul gradient loss function,,gradient scalar function ,have two function partial derivatives,
-Maintenance during operation abnormal yes, breakdown yes, yes scheduling, order , maintence, database yes,yes period, mid term maintence scheduled, monthly equimt inspection ,.
Implementation leader Education problem counter mesirw , trainer, equipment specific,inspection educay yes,inspection trait yes,self , leader Education yes,
- factory dry battery process, phenomenon batteries failling , revolving table, description loss balance,

-implementation ,system analogy,I/0 control investy application of embedded control controller to real time control algorithm input analogy output implo a closed loop ,how feedback use linearized ,non linear process and resultat in zero steddy ,
generate pwm outputs to implent variable motor ,supply voltage, Implementation a tachometer operational using pic 32 timer ,develop the CP program code to Implementation a pi controller moving average digital filter , monitoring display, reading embedded mechatron ,basic circuit pin microship pic , microprocessor, hardware basy trainer board workstation ,PC running windows,MC1 Linus ,12 v motor switch ,5 v,4A DC power supply,software ,mplabx plib cross ,
Project takeaway how read Nalog compare implent a pwu capture period measure , fundamental digital,open loop and closed ,process control ,
- fundamental concept ,unit introduction process electromechanic I/0 , automate process control engineering deal,automai process,open loop, DC motor speed counter record ,
Transfer functy magnitude response,phase shift ..

-Synchronous , .time period phase move transition job work
vibration robotics system
Mass spring force oscillator ...
Function , $mx''+cx''+kx=f(t)$..non zero setui mass friction k is the spring constant,f(t), Fourie series periodic function, f(t)= for.cos(wt).
- resonay, control nature frequency, control logic ,circuit ,
- frequency constant , capacitance,static displaced,static voltat resonance ,piezoelectric voltage constant .

Synchronouse robot dynamic, kinematics and control ,nomencenture ,operator , kinematics, introduction position represent coordinator , cylindrical, coordination,linear velot,reprensation velocity Cartesian ,rotation mayris ,active ,passive rotation passive rotation, elementary rotation,representation Euler angles, unit , time derivatives of rotation ,generality coordination ,mat lab ,rigid body velocity and acceleration,task space ,co-ordinate corresponding effect, f
- forward kinematics for planar robot ,are and effector ppsity, function rotation matrix c
-% GETULANG XJZ from option matricr (c) extract x ,yyz Euler angler from % rotation matrices,
% ,author,
- xy = a tan 2.(c(2,3),((3,3));
Y=atan 2 (c(1,3),sqrt((1,1)^2+(1,2),c(1,1)

Ph=[x,y,z]
Lifting job ,,,

Synchronouse.
Low of conservation of energy, mechanical energy (kE+PE), conservation, energie.
KEi+PEi+ wnc+OE= kEf+PEF+ Oef
Kinetic eny is key work conservation, PE, done by conservation forct energy are included, equation, problem,step 1. Determine the system,step potential energy conservation,KEi+PEi=KEf+PEf, step step enerivariouse ,object phenom.efficience,
Eff= useful energy or work out/ total energy input....
-Total change in energy of systu,
Δu=Δq(v2-v1),, Δu=IΔtv (I=Δa/Δt)
Total kinetic energy of system energie of system conservation,u = kinetic t, kinetic t=i.vΔt.conductor electric field greadui eneri,colliu t charge total charge vibrat of Tom heat energy conductorP=E/t.. Energy ability work done =energy spent power what meant DP/St, f= dp/ St, St/ St (m.v) , solv equation ,,L.di/St+RT=E°coswt..dE.dt=o demonstrate pendulum force u= m.gh
dE/St>forcing constant function..

-eskom smart meter infrast up grade programme relit supply empower them control consumer,meter consultation process meeting block tariff,meter renewable,customer interface prepay,remote .information meter5,,
-advance measure approach methode, complex energy systems monitoring and control kpi,based on integration of based of active power ..

Lesson teach note:
What's is nanotechnology: is NM one billion the length of matter to pir perspective, diameter average bacty 2500nm long material 100nm nano matert,,,nono scat material, involved the product manipulation nanoscale material products ,nanosciet consists discot and character,
-activity fields nanotechnology, @0 years research plan research ...
- the electronics industry,wath is distinct need between electrical appliances and electronics electrical appliances and t flow of charged particles electronics in this metal conductor copper wire ,found electrical cord home appliances non metallt conductor ketler ,electron ,non metallic conductor semiconductor found cellphone..
-nanoelectronics current and future applications.
- origins of nanoelectronics: ,100 atoms ,
- computer hips semiconductor industry:
CPU ,central pro easing units found computer, transistors embedded in silicon, calculatioy per second required keep ,replaced out data technology tubes 1960 s , accordiy to Moore's low named after ,PC transistor ,45 NM ,process 47 million nanoscy transistor distrt accross 26 mm ,compone computer,, Components found quick retrial storage data volaty data abscen d use carbon nanotubes , computer switch data retention,data recovery during power cuts,

- molecular electronics: decrease in size components molecular emerge task performance ,capacitors in electronics device ,capacitor store information, molecular been investigated act incredibly single electron .
- organic light emitting diodes OLEDs : television and computer monitor ,electronic device Thea days particularly handled device mp3 player ,ligth emirtur ,OLED organic light. Emitting diode 100nm packed betwt conducting film called electront film voltage causes energy ,compare OLED ,screen film, product,
- touch screen : technology as found in many table ,palm computer ,smart phones and news laptop,works , digital signal to control device interwar , layering of conductive film of indium tri oxide Ito , which conductor relay the ,x- y coordonne to processing components of the device ,smart ,ITO , technology.
1 nanowire can produced to high conductive transparent subnano wire network allowt hegher screen brightness ,with option of producing flexible screen Ito film,

- improvement batteries:
Devet in battery,lio batteries ,smart phone ..
- risk and safety issue: unique physicochemical properties of nanomaterial electronics industry , safety humait,nano party,microsct,mass ratio risk asst , hazardous nanopt,national occupation health ,incorporate.
- key issue to consider : renewable water energy have lagged ,, chip manufacture capabilities.
- future risk assessment:
The future nanotechnology in the electronics industry:
- conductor,:material that can transmit heat ligth ,electrical charge in case electrical conductor electrical conductivity mesure of electrical current move through material it can see. As opposite of resistance,
- semi conductor : a material that can conduct electricity.under specifical circulum voltage current flowing through common material .
- led technologie: ligth emitting diode are semie conductor device emit light as current from anode to cathode .to cathode energy from of photon ,is release electron through the led device bprocess called electroluminescence,
- transistor , semiconductor terminal current flowi between b,
-capacitor ,an electronic components store electrical charge consiste two conductive plate separate ,
- electrodes , the anode is the electrode oxidation reaction takes place reduce,
- graphene. Two dimensional one atom carbon atom bonded hexagonal the crystalline alloyrip structure a pure element ,pencit lead ,carbon nanotubes,hallow cylinder consistent,nested comprised of carbon atoms ,spherical carbon fulleren composed entirely carbon atom in bKk shapp also called buckbakk and buckmnjsterful,they commonly consist 60 or 79 carbon ,physicJ property , of substance relating to both it's physical chemical.

-Metering screen ,ITC manufacture nanotechnology transmission component automate ,,
Synchronouse system , synchronous intelligence it ,

Teacher’s/Mentor’s name, signature and date:

SOCIAL SCIENCES PROJECTS

NAME: ______tshingombe tshitadi ____

PROVISIONAL PROJECT TOPIC: ____

PROVISIONAL EXPO CATEGORY: ____

Delete all guidelines under the following headings once you have completed your Research Plan

Introduction

?

Problem Statement: What problem(s)/issue will you be addressing/exploring? Write the research question(s) or problem statement.

Research question(s): Question).

Aim: What is the aim/objective of this research project?

Hypothesis:

Variables:

Method

Procedure:

tables, graphs?

Ethics

Safety

If you do not have any potential safety issues, leave section blank.

Time Frames

References

Teacher's/Mentor's comments and suggestions:

<tshingombefiston@gmail.com>	Aug 28, 2023, 8:09 PM (6 days ago)

to
Support

Project social..

1.

2. Social investigation : science natural

Support social creation and recreation orientation circulum Assessment police social enterprise entrepreneurs sector products resource energie electrical commissioner ,training support system circulum , synchronouse system social machinery social safety government system in the time framework regulatority circulum sector education grade and level in the job system , development sub sectorial system system social worker synchronouse

Social worker public work system basic advanced must synchronouse with social system , labour worker OSHA safety society synchronouse with Commission electrical engineering worker data,

3.

3.1Teacher mentor :social education

Social education labour and land reform system , organisation entrepreneurs and humain resource system education system asynchronous,system class society ,grade society science mass media society work classes.

- families class work project, organisation non governmental social education entrepreneurs workers sub sector self employed self business was illegal or fraudulent system in normale system entreprise government system asynchron, need to educate social media by training for to synchronouse,

-3.2

lesson system social media support rural to teach and non gov,

-file worker, size years, skill development,size ,class skill ,model frequency ,means , value compared ,size social skill or semie skill grade , qualifications employment years , normal ,criteria choice guidelines normal, ,,report learner ,report job normal work labour synchronouse , report job pay hr give normal conditions , . Calcul system find balance merge social .good job

- 1..mathematic investigation ,

Framework regulation circulum policy for mathematics resolve ,

problem for science discovery system

Equation computing system equation, algebraic logic , analyse system mathematics find problem or concept ,proof existence natural system undercover real problem in natural

System exper or artificial intelligence or language reason calcul,

Synchronouse system to find more equation algebraic ,complex numbers master system deviations system ,equation find mathematics number master skill knowledge,proof existence of system function or gradient function ,function was real on distribution and transmission power ,was real system that was equation remarks for master number , mensuration system equation and compare slop of number deviation ,angle period time volatility time loss time break ,that was equation , trigonometry and geometric pattern number , statistics and probability to find on projectsion number real and case reason for linear systems..

1.2Teacher mentoring:

Teacher education,system mathematics education subject lesson circulum, apply skill compilation language logic intelligence or robot system capacity of synchronouse system, mastering skill number use instrumental take measurements rule and measure instrument for understanding

Lesson plan orthopedafic projection planing , synchronouse ,system scale analyse geomatic geodesis ,vector equation quadratic linear synchronouse mensuration equation ,

Activities ,system resolve plan diagram current sinusoidal wave form angular system projection orthopedics activities,design form , computer language wave,

1.science natural chemistry physics:

...

- project

Investigation: natural science: earth moon sun planets system quantum years ligthning years days start day end of day system ergonomic design

Natural teach discovery

science engineering

Investigation , physical and chemical,

Engineering ,computer information technology, mathematics mental calculation

agronomical grade class agreement , grade geotechnical grade class years geography engineering,mining investigation grade class matter

Investigation, science class matter elevation matter atomic cycle ,Watters cycle , recyclage matter ,investigation find matter chemical composition matter ,solid ,GAZ liquid state , molecular ion electronics development skill materials ,charge dischage movement find current electrical mining agreement , degradation material and graduation material system , synchronouse material system Earth system cycle life skills ,,..

Chemical. Size system difficulties to synchronouse for reason challenging life and disorder order natural system undercover real problem, industrustriel

-Physical state matter Liquide to GAZ,GAZ solde ,solide to GAZ process

Synchronouse phase transition matter,

Electricity man's mecanic,

- electrostatic ,electrocinetic, electrodynamic, electromagnetic, static,dynamic ,cinematic ,

Electrostatic investigation phase system matter transformation ,force electrostatic transition electrodynamic phase to electrodynamic current to resistance resistance to field magnetic,,force mass phase ,generation phased to transform phased , system skill , transmission , distribution system synchronouse real time ion matterial speed celerity transmission ,km/s

- teaching education ,science natural investigation , psychosocial psycho science development system natural task system computing file system Education technology system science didacic system framework regulator,

Teaching phase transition phase synchronouse system development , chemical sciences ,,material phase material transformation plastic ,elastic deformation material ,, computer system matterial decomposition chemical atomic spray eating phase GAZ generation force cycle synchronouse system generation to system transmission and distribution Metering, ,atomic spray heater product coil consumption phase cycle generation system going ,to transmission ionique chemical computer system grade support to grade transformation synchro reactance system , electrostatic electrodynamic magnetic synchronouse to wave to distribution system ,,, resistance way system for material recyclage, phase material strengths,,

tshingombe fiston <tshingombefiston@gmail.com>

Thu, Sep 7, 3:18 PM (12 days ago)

to Support,
TSHINGOMBEKB, me

Teacher mentor: safety security accreditation teach traffic police

-trade vs learner vocational , accreditation safety security safe,road teacher secondary safe road usage, foundation for road safety meaningful maturity existence self control technology and responsibilities creation genesis magniful machine sense of responsibility and Education task of the school compiling, traffic training in the secondary school, traffic situation child youth road, orientation youthful level abuse, among legislation low vehicle element natural insects phylogenetic,pretestimonal,

-road safety education and Education part perspective stretches maturity Education situation situation child rod block, chorence,psycho pedagic perspective magniful questionaire secondary school child learn in the road safety education situation always leave among others think fact, concept compare matter interpretation emotional fluctuations inferior child master road available of book,

-fundamental relationship understand authority between teacher and child teacher and parent risk child freedom resposable,

-A social pedagogy perpespe tive road safety education always take place social situations secondary child creation communication gap, between teacher parent.

-didactic perpespe tive in design diffential road safety pedagogy diary situation teacher has keep following learning action the subject matter must be interested practical, experience involved.

-An orthopedagogic and orthodidaction problem study learner is to indentify secondary purple mine whether hold implications safety.

-child basic characteristics aquerie methodology of road Education maturity aspect lesson discuss holding gather,

-the goal traffic education, traffic lesson objectivity clear identify basic, the learning on skill or interpretation problem setting and resolve challenge course advantage grouped pupils activity part in the lesson understand manipulation,

-course of the lesson actualization Pre - knowledge safety lesson pupile have knowledge road safety pupile.

-teacher discuse, unlocked of new content basic functions pupile may expected road, groups discuss in greater class arrangements variation place criteria judging success group discussion example,ex lesson a telling subject STD,6 time, Education object lesson to explain pedestrian behaviour the learning objectives

-schematic present of Education and teaching, teaching and software and hardware visual.

-education qualify audio visual teaching knowledge,

-safe driving and elementary knowledge of motor vehicles,

-pupils car owners car motor complicated mechanism dangerous master to supply of in sight those of driver, gravity,parking down ,centre inertie, energie,collision friction force impact counter determiner force impact limitation mental emotional film understand,,

-conduct assessment police,driving asssessment police traffic on learning assessment police ways on policy on assessment police engineering way to manager learner in management system police vehicle information learner transport information circulum learner

In phase period synchronouse system and asynchronous system phase movement in out file compilation

Management learner to manage information system IMS, securite, student information system advantage and consideration,role management information systems in Education and in police or Industrial, engagement power cloud base schools management system,

TSHINGOMBEKB TSHITADI Wed, Aug 30, 7:39 PM (4 days ago)

tshingombe fiston <tshingombefiston@gmail.com> Mon, Sep 18, 3:39 PM (22 hours ago)

to Support,
TSHINGOMBEKB, me

Engineering science:
Education

Teacher's/Mentor's name, signature and date:

Social education, education environment ,geographic life cycle industrial recycle synchronise system biogenes system hygiene system

project expo science

Support <support@exposcience.co.za> Tue, Aug 29, 2023 at 8:59 AM

To: tshingombe fiston <tshingombefiston@gmail.com>

Good day

Did you participate with the same project at a regional expo?

Expo Team

63 Reier Road|Atlasville|Boksburg|Gauteng|1459|South Africa

T: +27 11 894 1365 |F2M:+27 866243127
www.exposcience.co.za

Re: Documents wallet Portofilio,office Engineering project order management appointment project file order sale campagny meting tbrigade,edutech psscm… agenda office .PC safety wallet documents financial office

-1**. Purpose: documents wallet Portofilio , documents systeme info., project appointment office Poste**
Agendas office PC safety wallet document wether documents,data base , documents network research office appointment.
- project month ,order document . Order screen. . Statement documents.

1.1.Purpose: documents case book .booking documents
, financial information documents office ,
-Office document
-post documents,

--Poste wallet easy documents Poste
---office ,post bank , archfile office document ,
Docket..
-Documents arch file
-Documents stationery document
-Documents office
-Documents database system .
-Documents bookeping sale buy ,
-document library bibliotech.,
- documents,
.--- engineering creation document .,
Post document office appointment submission close ,
-Price documents, price close tendered ---Poste value bid posted wallpaper,
Minimum required Poste tendered
Spreadsheet,office PowerPoint, -documents ,office post address documents
Relyan documents,
-Documents memorandum access documents Poste office , documents reading , documents ,
Project posted
Appointment post documents wallet report agendas
Project
- documents processing input output
Wallet project, management

- documents screen radiographic documents scanographic documents photographic document image documents artistic valeur attributes document pixel coulor , documents
Document monument magazine monaitaitarist ,tableur course, documents,
Documents note ecriture

3.purpose . documents wallet Portofilio evidence,,
-Documents wallet registration form appointment office Poste wallet easy.
- register database documents wallet
Programmation office register document.

-Database employment documents wallet .
-Office document wallet Portofilio.
Information recruitment documents wallet information employment system
Database office d base qbasic visual basic office COBOL .
- office project database documents wallet .
Stationery document wallet office information handing Manuel system
-script hand project documentation
-arch file ,office folder desk information table time table task operationel system case paint case book library office ,
-office size .mass. meter square area
- casebook, rerwiten framework tools form assessment formal Summative office ,
-Tools frame text page , stationery design printer sign industrial papper standard.
-Tools paint case design ,
Office automation machine system la guage conversation convert reader PC and environmental PC printer system recruit machine database system project , documents wallet arch file database electronic memory wallet ,
Documents wallet information employment system specific, responsible,,
-Documents wallet bank account database automatic ATM ,printer bank ,stamp teller stamp , statement,check database system , account books library bank ISBN order book bank order project book bank wallet , employment salary
Record book customer reviews, customer record registration ID number system information, Documents wallet Portofilio job career emploie,
- database emploie system entry and dabase outcom up grade ,up database system project employment opportunities, ID
- ID registration form record form entry ,form exhibition,form move , form period form years value database emploie
Emploie record training job graduation,job training post advertised documents wallet resource humain , personel
- ID registration form customer recording training custome entry exhibition, database emploie graduation job post customer sale reward award customer ID wallet documents Portofilio, officer
- bank account statement bank customer clearence cost amanded correction reward discount I'd customer deregister penalty, I'd customer record emprissonement labour work I'd cost years , system document wallet office information handing,

- program logic control customer ,logic system custome I'd , programme language machine customer database system document wallet Portofilio, I'd
- wallet I'd trainer, course job ruling job duty job post job weekend job . Wallet account e wallet easy pay system.
-Print I'd framework, print I'd information,,print post ponent I'd ,print job duty post rosta,print task operation print salary day , prive over time ,printed provide fund ,print tax job revenue emploie post ,print compensation award job , print insurance job ,print data dol registration labour, print conciliation arbritatiin ruling job conduct job day 90 day years progress conduct , misconduct,dismissal award job,print holiday job ,over time ,print pension job ,print intellectual property job register ,printed social insurance job security job , printing policy job record database system wallet accountability systeme, print order case power attorney debate creditor legal job , printed training record job authority job skill development job, training certificate in progress ,award certificate,printed agreement settlement job , print documents grand total wallet statement salary emploie resource emploie,humain ,material visa printed code , registration, database system providing fund , earned award printed ,
Convert
-0ffice wallet Portofilio Poste office documents wallet resultat ,re posted , disappointed documents printed , rejected documents, expired documents posted up date documents,up grade documents wallet Portofilio employment and custome record , licensing database.
,- design project office to office travel office information system, management information systems documents, ,
- design projects inovation management system conduct process following database maintenace wallet account account posted recruit machine database maintenace repaired , intelligence systems rebuild office , rebuild Poste re posted policy meeting, reprint documents review document support, wallet account,

Booking: filing documents posted wallet account documents booking
training records ,
-office travel,,office cad corol drawing ..project office documents wallet engineering drawing .line work , planing work, planning jobs, systemWallet account dr

12.Engineering:
electrical

1. Purpose
documents

9.purpose : documents wallet,office,
Training customer office record , documents,office,
Training customer,and training student university trading up date upr grade student information system,up grade connexion system,
9.1Purpose storage , office genie counseling,genie soft ward genie hard ward ,, safety security policy office counsultant jurisdiction
Documents submitted
Assessment and re assessment peer self group information technology intelligence , technology
Technical PC vs science computer vs qualifition insurance information
-help memory pilot math information vs campus numerical box ,math info,news technologie ms word ms help memory copying syllabus training Unix Google
Intelligence artificial genie logiciel , input technology ms office creation news technologie help memory use for ms treatment technologie input output system expert intelligence capable resource human capacity not it includes mathematics algorithm ,,
- calcul arborith , topographic topologies aerveur , intelligence robot automation science language science language science computer science language ,science mathematics chimic physics stereo chimic physics synthesis and , Polytechnic electronic information technicien ,,no ITC it is include work topic it faculty option intelligence artificial and genie logiciel ,
- pilot lecture pilote fly driver disc memory network navigation,
Mathematics sacrifice workplace visuel basic ,
- honesty intellectual library pilot ask questions training PC cyber ,training research ,x vs y procedure create page create algorithm arborith ,step number phase fine creation page , button exportation language literacy ms word , creation find studies habillement ms word creatt find studies caractere address vs medecine mycine bio algorithm ,science Polytech algorithm
-retetion office ,button cyber button command ,do's vs algorithm procedure medicine to mutch work office contii algorithm is vs algorithm for students ,
- subject theory vs for laboratory training work , literature 'creat visual basic office protection documents client terminal all letter memory ,
- algorithm initial procedure select , operationel insert button, click operationel,
- information processy vs Computer office , financial Computer ms , window theories safety policy theory vs ,technical PC ,vs science , PC ITC theory create cover page letter folder create financial fibre optics create xompui lettre CVS ,create ms word processing marketing processing asj , buttons ,create for data data base office ,intellectual ,oms algorithm PC ,technical mathematics science PLC ,robot Unix,
-info process vs computia vs management system information business PC ,admnistry PC theory cover ,page office traine power point acrob converse,
- mathematics info comptabilite invention creation plan comptable code binaire calcul, vectorial code binaire 'calcul vectorial dimensionnement algorithm mathematics financial invention plan financial savant Gestion ,
-arm calculteice commercial, invention formuler mathematics function grand droit ,
- invention: ax+ by+c. functionalite logiciel rigth autocad cad ,vector financial functionalite value

adddiatribution ITC ,scatter robot geodesie projection ,invention mathematics ,savant mathematics autocad,memoire mathematics
-inventiin mathematics info science computia mathematics exchange call cash nothing financial functionalite,
- invention mathematics series sequence integrally ,x =3 ,if y=4 else the x,y co - ordinal scator ,z = matric information equation ,x+y = 0 Fortran sum limit x ms ward display, ITC InSite mathematics coverage page is site theory in site rules ,matht recruitment info mathematics recruitment informer investigation Mathe quadratic make square rectangular plot investigation quadratic information language display generate for ,no it robot intellectuel system mathematics invented equation ,x+y = 0 quadratic,
- no invented robot x,y function scater robot intellectual ,financial invented calcul, permit to account money ATM to save formule ,
- info language inventor informer
- info invented process,
Mark ROM,octal ,
- math info initiation information arithmetic logic process logic ,Espace pixel VGA,cla or, invention
-mathematici do software invention hard math PC ordinance sequence,MHz gigabit calcul logarith intellectuel processor it mathematics invented equation computing ,
-ms word disc mathematics character 100000 caractere programs frame program , excell table equation financial word limited
1099 word octa octal binary equation,-ms internet robot word page mathematics character system mathematics,
- do's mathematics code 00000,
- math inform science and computer science chimie info physical science chimie faculty chimie instrument, conversion synthesis,
-mathematici info et Polytechnic and science academic material mathematics,
- power supplies arithmetic machine ,process control project ,VB ,access , actual technologie ,info mathematics equation logic integral Lim actual review series automatic system robot language technology mathematics ward caractere , actually technology,information ROM ready, access.memkry,

,

to
me

Schematic
showing

to
me

Schematic showing a 3 phone system new button visibility above ,each handset must installer ,intercom system used surplus ,
- parlist : handset regular telephone type no push to talk or sound ,power , lungs buzzer 6, volt Eduard 15 ,see text cradle switch phone or see text , strip text cases miss hardware,form system every 6 day or equivenlent ,6 volt interconnected , distribution such shake ,

- personal call plan :
Telephone call plan B1, B,2,B,3
Call A1. A1B1,A1B2. ,A1B3
Call A 2. A2B1 ,A2 B2,A2 B3
Call A3. A3B1,A3B2,A3B3
Call A4. A4B1, A4b2, A4b3
&1 alpha= the effect of in the level of fonctionnement call telephone call plan ,I=1,
Beta=the effect ,ab of factor level , x1 jk= , error association observations level plan analyse

- radiotechnic,
Power amplificator TV sound base oscillator pentad tube ,
Characteristics indirect cathode wire V,1 6.3 v,
Source wire,
Use conditions nominal RMS,
- voltage and. Va - 170---250V
-voltage grille. V get --170--250v
Voltage. 45 , 32m
Current. 62 2,4 ma
- coefficient amplificator. 15 ohm
- resistor internal 0,2 , 4,6 MV
Capacity
Capacity grille ...CG ---14,7 of
Capacity and grilled cage <0,8pd,
Value limited
Peek voltage anode vap max 7,kV
Voltage anode Va max 300v,
Voltage of grill. 3000,
Cathode current v max 30 w, 180 ma,8,5

+ Telemetry video output pentode ,power flip flop, ,

- emettor , af amplificator ,emettor ,compositor number ,receptor ,display , speaking,

- IR(t)=VRF cos (wi.t)=I(t)+Δv1
-QR(t)=VRF sin (wot)=Q(t)+Δv2,,
Insulation in receptor conversion,in case we Cree en our mixage voice I et Q ,, Voltage ,, quadrature, insulation mean level power

-typica using single side ,
telecommunication street distribution for new urban residential estate
Electricity peddel ,started conduit , road way ,
Legend ADSL signal spliten telephone , exchange, ADSL convey frequency , asdl modem yes customer premise,,
- typical grand copper twisa. Network telephone exchange, ,
Cabling homes for telecommunication completed guide home cabling ,
Line 1 yes ,line 2 yes ,,phone ,1 yes ,phone 2 socket jack yes , mode 3, 5 equipment,
Possible fault due comming of the telephone voice port inside , fault due to switch relay connect in mode ,,
-basic home network system typical cabling arrange and connection for , typical telephone and data services,
,Famut TV , bender PC, study PC, kitch PC ,wall ,,ethernal
Legend : modulator socket CCO,modulator coaxial socket , coaxial plug
Polyphase emettor receptor frequency intermediate heterodyne class,modulation phase phase (t)= cos (wt+$0)
Sin a (t)=o,then m (t)=o module phase shift signal module ,m(t) = sum ,,
-canal of transmission GSM cellular antena interval time area 577us signal terminal,
Wave electromagnetic tic plane impedance caractere area,E/H=377 ohm ,, schema btsbsc,msc network fixe ,,
Numeratation of voice
Fibre cider , module, filter decoder ,input output band 300hz - 3,4 kh, 13 bit cadence ,,

Input line l1,2,3, cabling
- circuit command selector , meter decimal Relais , rotational test , duplicate line off,cut line , Decimak control ,direct A, switch register in the register in the group the calling division aearxf variety,
Switch line ,switch final connecter ,signal control send impulsion ,interconnector , pilot switch start , div ,div,,,

-multivaria data analyse telemarketing,point ,do√ sumb(x1k-xjk) exp 2,, structures equation model customer loyalty adversity board award , quality imagine customer satisfaction,x x=, loyalty= b1 brand customer ,brand equity =C 1 advertising + c2 brand award + image price customer satisfaction = image price,
-diatribhtor performance
Distribution/ service ranking X1/) overall performance ranking y1// ranking differente d1=y1=y2/// diffential sequence,data analyse , investigation of association ,
- Winer trading plan bet
Net profit= number of wine bet x premise pay out motion number of lossi. ,bet premium, y profit or loss,w number of winning vet ,k payout motii,

-model : l

Model: ml 06NP, ML6,c
- capacity : 6kg -15-30
Resolution: 1g+2g-5
Weight range ,- 3 kg ,7,5-6
-train display ,zero net
- sub display: zero net ,vf d LCD graphic ,
Disparue dwe , ply memory/ ml on
Print / rypr , available size labej ,Manuel
Max : 90009,pl, width
- label printy , interface,power requirements ,power consumption, operating tem plotter size ,mm ,product model
- report financial
Option model product
1 m b memory ,
Specifications display ,operator ,5.2 LCD , 2x 16 pop up ,20 lines
Memory back up , data up vendum lithium ,power consumption , AC 120 v ,operating 9A, standards 0,2 A , operating AC 239 ,operating dimension

-system development:
Sample Gant chart showing progress system development activities by putting bar ,
Project planning documentau, page)
- system ware inventory system modifucatt system ware house ,
- system schedule activities completed activity,analyse
- activity ,/1/2/3/4/5/6/6/8/9/12/13/14
-required definju
-for project team
- definition and
- definition objectivity
-R3 interview whereataff/
Organisation required
Vo review
Design
- revise programm
- specific report
- specific screen
- specific documents

- soexifux Documents change
- management review
- implentation
- code programxhange
- build test file
- build test
- test produxtiin file
- revision product file

Revise
- production file
- revision

Test short Bev
Test product file
Manage teab
Install where house
Teaini new
- quality management iso 1999 totaj staicale process control ,produce software group project team
- product / vendor

Designer) Oracle
Development studies) Microsoft
Knowledge/ system architecture,system investigation use engineering computer case tools automate ,task required system high degree , package focused association stage v, arafw case tools selected
- development for orientation program

Frequency (y,x ..) 1/6/15/29
Head score x /0/1/2/3/3(5)
Score deviations/-3/&2/

Purpose: technical PC vs technology PC support ,
-Technical PC electrical electronics PC
Open lab ,mechanical electromechanic mecatronic system disc , buildings construction PC architecture PC
Art PC hierachie vertical horizontal process word , excell algorithm
Fundamental PC ,
-fabric fundamental process system
Fabric circuit resistance ,
R: material, R=resistivity ×l/A , I =w,,R= resistivity .l/y.w=, R3= resistivity/y,,
-metalic late fabric , semiconductor film metal oxyd silicon Fuk autonom career , Sio2, ,,input R1/R2 ,, DDP/Nikel, charged ,,,discht batteries radio
-Pbo2+2H2so4+Pb=PbSo4+2H20+b.bs0
Turned. 1/2πfc=2π.f.lresonanance,
L.fo..fox=x.l=796 khz select ,Copa ,,
-if filter modulation signal, mixer yes ,local oscillator yes ,,
-Am yes , 1mv, first r.f yes ampli, second ampli yea 50 MV,, detector yes , AF yes ,power out yes ,5V, 10 w,,
Dielectric: microwave , wireless communication technology yes ,master oscillator yes,
-master oscillator yes, multi yea ,power yes ,antene yes ,,
Parabolic yy advance ,
D= Pmax/PAV,, Scat = 174.698/DM,,
G= k(π.D.D/x),,impedt , Z =√R.R+xl+c),,z= R+j,,

-electronic digital analogic circuit ,,
Input a,b and gate yes z= A.B 1 kilo ohm,
Booleen algebraic,A+A=A,,

Identify booleen symbol switch circuit function F (x,y,z) = z in ,
Karnow map ,,y,z
AB+AB=A@b
- decimal number /x//y///z Min term ////max term
I/0//0///0////0////x,y,z//////x+y+z
_analofue computer , comparison analogues and digital computer,
Quantity,/analogue//digital,
1, representation /continuous voltage //binary number changing step
2aritmethic /by measure voltau and // by simple add ,losing course shift
Output of information/ graphical // languages quantity data storage,
Storage,
-potentiometer coefficient resulted and reducing voltage integration by factor (6/12), initial x= 6/12 chart capacitor, input output and gate,
Inverter integral circuit DX/dt 6/4
12,

Sum ,interger ,summat,
Differente RLC
L.di/dt.+R+ 1/c integral I St
E=L.dk/St.ln+1/c.inyegral, 0 time ,t
Timer ,o'clock

Initiation condition variable ,respect time St ,, IC input x,y output eo=[f(x-y)dt,, (eo) solving differential equations,
12 DX/dt+6x= ,given x =6/10 at t=0, derivation, DX/dt+6x/12 ,equat,these 6/12 require at output integration,
-conversion
Digital input a,b,c,d yes D/A..output
Digital / analogue
D,c,B,A/
0000/0volt
0001/1volt
0010/2 volt
0100/3volt
0101/4 volt ,to
1111/15 volt
- full scale voltage , ex 9.1 5 bit D/A converter ,0,2 volt digital in 00001,analogue 11111, si SB =0,# v and 1111=31 full scale output = 31×0,2 V=0,2A , even 9,2 A 5 bit D/A Conte delivt in output current,100mA, digital input cours digital analogue output cours digital of 11@0@=10ma,, 20 = 10mm let B = 10/29=0,5 mA @110= 29×0,5=14,5ma,,

- algorigram equation booleay,,
Prog, start writing a few dug a possi yes , test run progrt yes,or fix bugs an introduction as news on possible, yes
Bughe , stopped,,
-x = 1 and y=1, yes A<Byes x-x+3 and y-x,y ,print z , A,< ,x,y yes , x-x+3,,y+x+y, z<x+y

-machine code programme ,x=4a.a+2b,z=N+(x-y)

-op -code /address
1001-load ACC/a= address 0000001
1010-multiple /b=address 00000100
1101- stop x= address ,0000011
0001-stop,,
- construction PC architecture design development,
Input unit yes mouse optical keyborad yes card red , control unity yrs memory RAM ROM yes , output yes arity yes CRT display print plate yes,
- database yes
CPU yes ,room yes,I/o, yes vertical ,
8 bit 69kbyt,, 64× 1 k=65536, FFFF,52428
Memory systt ,@00,

Digital / analogue,
Sequence+3v yes 0,15, yes a+b, A,B ,
Room ,ram ,,
Inlut
Row,yes and Dara,yes gate and output gate and ,
Transistor bipolaire logic diagram static RAM , ,select R , supplies logic ,y select ,,
- booleen algorithm: program, read write yes, memory registerer x,bit ,.Emory buffer,
-printer charge plate ,electrostatic , digital input ,carater source ,papper,
- lazsr printer ,trasfdr ,Lazer,mirror,module,
- ribon papper,character, rotau,
Magnetic tape. Supplementary capstir,data organisation file
-data memories time yes,
128 sector memoire, 564 bit sector,
Input output device microcomputer converter serial data , parallel decoding, microspace,ram 16×4 ,, binary input yes ,
- disc label plastic with write. Ed inde hols ,
-sectir track 2,255 byte ,logic process read, digital ,step motor ,
- NV ram yes ram yes ROM yes, CPU semie conductor yes ,hard disc driver yes , external yes flopy disc ,data 150 km to 12m ,@00 m ,
-Typical machine code
3 bit /5bit//descry
000A/AAA1/load AC
001B/BBB/
-adress / code//instructions
000/load branch output /load a.c
001/
0010
0011/
0011/,

Network interconnection cellphone PC ,,

Purpose: project and circuits ,series and features, and services
Constructional project:
Design concept, sample ,circuit ,
Part list multi message voice recorder,
-1 PC board code ,size 119mmx 57 mm
-electret microphone insert,
- 3 way terminal blocks PC mounting
2 way terminal block PC mounting,
- 2 pin section of Sul header strip ,
- jumper shunt ,
- 28- pin Dil IC socket , 15.24 mm spacing,1 8 pin Dil IC socket ,7.62 mm, spacing, 1 2,5 mm concentric DC power plug ,PC mounting (con) , audio phoni socket ,PC mounty(con 2)
- semiconductor
1HK828 voice recorder IC (ic@), lm 358 dual op amp ic2, @ 78l05+5v regilt(rsG @), 1 5 mm green led (led 1), 5 mm red led (led2), 1 1 N 4 004 @A diode (D @),,
- capacitor:1 ,2200uf 16v radial elect, 220 if radial electrique, @ 22 uf radial electrique, 1 4,7 if 25 tag tantalum, 1 220 nf 100v mkt metalisssd polyster , 100 nf multilayer monolithic ceramic, 1 ,150pf disc ceramic,,, resistor (0,25w 1%), 1 . 470kohm. ,2. 100k ohm , 9 , 22k ohm , 2 . 1k ohm , 1 , @00 ohm , @ . 47 ohm , 2 . 680 ohm,
From ,kit available
Link 1: in = beep disabled, ,,,lk2,/lk3/ operating mode , in /out/ 2 message, random access,/ out / in ,4 message , random accet, out ,out 8 message random,access ,tape

2. intelligent dimmer:
1 PC board , code 799, availabt ,service size 76 mmx 50 mm,
IP 65 sealed abs plastic case clead lid ,size 125mn×85mm×55mm (jaycar HB - 6#46)
1 .flush mount 3 pin main socket Jay car ps ,4094 , similar
1. IEC male chassix connector with mounting holes Jay pp, 4005 , 1.10 MHz crystal (X1),,,147 uH 5 A inductor jaycar LF - 1274,,,14 way Dunkle vertict sockets con Jay car H3114, 14 - wat Dunkle screws terminal plug (jayecar H M-3114,,110AIEC main cord,
-Semicondors, @ - 1 pic 18F 1320-i/so soic Pre programmer microcontroller,(I @),,
@.IR receiv jaycar zd - @952 (IRD@),,1BTA 16-500 isolated tab triac (triac @) - do not substitute,,@ Vc337 NPN transt(A1),, 2RGB 5 mm common anode led (led and led 2, 11 N 4004 diode (D@), 1 UF4004 ultrafast diode (D2),,11 N47341w,,5,6v zener diodt(zD1),,
Capacitor: ,,1470uf. ,16 v radial electrolytic,,1100 if @16v ,250v, AC x@ metallised polypropylene,,@,1100(0,1uf)250v ,mettalliaws polypropylene,,14,7 nf mkt polyster ,222 ceramic,,
- resistor (0,25w,1% unlet Alexi
13,3Mohm ,1w. ,,110kohm ,1 w,,11kohm,11 John wirewound , 12v operation,,,14709ohm 5 w wirewound,,
-miscsllabsouse,3 m3 x 25 mm nylon s Rew (to secure px board, 2 m3 x 15 mm nylon s Rew for IEC connector, 3 m3 ,12 mm nylon space,10 M3 nuts ,,, 1.100 mm of 0,6 mm dia .tines copper wire for link ,1200 mm length 3 ,core Naina flex 250 v 10 A rating , 14.8 mm red spade connector fully insylau, 14,8 mm yellow spade connector fully insulated , 14,8 mm yellow spade connector fully insulated , 5 100 mm cable ties ,,
- additional part required for testing:
1 .12 v AC ,50 ma ,or 1 A plug jaxj , 112,
1.12 v ,, 300mA light bulb
Design : drilling the lid ,,install with crio ed, components side board ,,copper side of board ,, cut out for IEC mains input plug

- building the circuit wizard way ,
Decade counter ,0-9 using j- bistable,amend ripple circuit and gate, flip flop ,
Investigate
- a block schema diagt of logic system ,,under carriage door warning logic
Five door switch logic signaj respective door open and logic 9 when close all warning indicator are active low visibility audible, study what logic level appear point x,y,z all door closed, wath logic level appear point x,y and z with the left wing door open and all other door closed ,wath logic appears x,y and z with open all door closed ,4 when any more ,
- answes to xhet quest ,,feed back via collector
Mp lab,library install tutort program
-led
EC reflow new professt,PCB operated from professional machine

-supply voltagt : 239 v / 50hz only
Power : 3500 w
Weight: approx 29kg
Dimension 629 x245×520 m(wxHxD)
Hear methoy , combination it grad and
Operat: directly menu button LCD ,
Menu ,englit,, temperature #5to 300
Maximum pcb size ,400×#85mm
Temperature ,2 internal ,optimal
- tear measuy
Component list.
Resistor: r1,, capacitor, semiconductor D @ to ,IC ,,miscdlanouss

String buton and function using button s 1, S3
- command action interacty command
Lab testing

Specifications:
Suitabifor 2×16,4 and LCD display using stanu14, or 16 pin connector back software controller,backlii,
5×6 matrix kepad for maximum of 12 key switch or nine rotary encoder building inpusht equivalent,buzzer,on led,power via USB,external 5 v supply primary cell,0,8-4,4 v lipo battery ,5 v and 3,3 v regulatority sodtward on off contri possible, lipto battery charger measure , 34 bit ,48 pin LPC 1343 microcontroller with 32 kV flas memot ,8 kB ram and numerous peripheral like USB, ix,spu,mlu uart , compatible with the free LPC presso ,3,4 and coocoz ,ise,,compatible,debugger, extension connector almot, availability on connection ,splita le , detachable Min 4 key pad maximum. 3 rotary encoder ,dimenst adapted to type 2616099 case open source ,
Operationel: microct,stars is oscillator
Arm operator logic

Purpose: open lab system, game completed module test test practical, test power electronic numeric ,logic sequence, programmation amplicat feedbat,
- experimental voltasi out + 15 VCC protection short circuit ,12 vci ,2 ,24 VC, functionalite,generationde sequence amplificator 5 v , frequency 1 Hz to @ generator ,@ Hz , transitor Montee,@ Hz to 1 khz , transisty logic true false
MOSFETs, cont rectifier motor inverter, principal ,12v ,3900 rpm ,1,2 A , 3 cm , logic numerical ,4 and (2 input) and ,3 input ,12 and , 4 input , 12 diodes , restrictions, study ram and stockagw information ,pannel ,4+4 buffer ,3 stare register buffer ,8 bits ,decoder , of 4 ,19 ram , 1024×4 displt, hexadecimal, analogic 8 bit ,convertisaeue ,8 bit poteu,
Bistable panaux , demultiplex,4 flip ,compare,4 cannot, register , calcule , arithmetic,16 logic ,4 bit , compte binaii,decodeur elrom ,8 sons led decodeur , linear discretion ampli relay , cablage schema , test execut ,system mesure norm , network transmission,53 MBS ,16,,
Biomedit, multimeter,3 and 3/4 ,voltagt cc ,490 MV , 400 v autirange generat, ,,
- detert type size ,if move water ..
If , else , else if to ,increase,,
Procedure PC ,input file control ,select print ,data , print file ,work store , registration ,

Purpose:
PC speciation: format
Intel core 7 , exaterne 975 @ ,3,3GHZ,,Intel DX58SO motherboard,6GB ,G skill trident DDR-200 channel,gainward ,GTX580 sponsored by evetexh ,wD 320GB ,data IU Hard drive ,Intel core ,I 7 870, Gigabyte P55-UD6, LG flatro n , Kingston SSD now ,,
AMD ,, specifications:
A, essential up grade, components, AMD , procedure , chip choice: the starting dusk x 2550BEb,CPU ,,X4 645 upward faster closely, processor ,direct conflicts show improvement,load processor specific benchmarks 3d rendered video encoder x 264 raw computation performance of up graded CPU increase ,time faster CPU therm ,,fps function ,,
-graphic upgrade: news little graphic card up date gaming Phenom power x 25550 choice graphic card filled card up grades , sub R1,500 budgr choice HD 5770 bigger to jumping performance DX 10 gaming word in conflic,
-playform up grade , CPU up grade path for LGA ,775 sockey motherboard PC area ,LGA 775 core ,3 GHZ, core, 2500 k CPU , 4GB of DDR, ram ,,
- direct x9 tessellation performance,
Heaven 2.5 / frame per sencodr higher better
Base system with sapphire HD 550/@7,#
-ugradr to HD 6959,

Direct x 9 gaminy performance
Lost planet 2/
-word conflic /
-far cry #/,
-0n the card tried edge graphic tracked down @gb sapphire 5850 Xtreme , retailing R 2000,price complain 6 pin power connector which PSU PSU had it physics driver installed benchmark away, result were disappointed 3 D marks improvement less word conflicts did manage,lost planet frame wallet being R,2000 light, completed reliable,
Battei g ram: slot 1,GB system memory stick R150 ,ram benchmark,ram ,,
- upgrading memory and processor GB ,test windows CPU,the HD
Windows shopping GB driver
-rigth components for the perfect budget building: perfect machine
Shopping list
- motherboard
F1A75-M - R1.100
-Processor and
A8-3850 - R1,300
-Ram: corsair 4 GB
1,600mhz -R1,000
-graphic:xFX random
HD 6670. - R 1,000
-storagr ' seagi
750 GB - R 610
- opticy ; lite on DVD
Rw- R200
PSU; Corsair 430w R470
- chassis : cm elite 343/
-total: R 5,360
Purpose
Built: test components:install CPU vital component case layer CPU guard ,CPU pea, lockdown add sized ,
-cooler and fan : fixing , bracket underneath ,screw holes fitting ,connect cable mobos ,
- fit the ram : ram open the catch,snai lock motherboard, memory Chanel ,1 and 3 operate,
- the graphics card ,CPU bandwidth drops xb soon involve another GPU, in an slu ,cross fire x array ,. manufacture usually,x16
-hook up the PSU connect ,20+4 pin connector to mobo,the 8 pin EPs cable and whichever 6/8 pic ,
-test the components: power that sucker up by turning the PSU hitting button ,your screwdriver board
Striking the balance, because corsair 4 GB 1,6000mhz DDR3,liani ram APU shares the systt ram between CPU and CPU match up ram gaming rates between at 1,33mhz and 1,600mhz case , resolution monitoring

Prep the case : bits ,ATX backplate and mounting screws, install the PSU screw top bottom cable out way module,drop in mother remove the GPU from mobo for the CPU Coller ram still in place mouti f screw it in place round,
Reunite GPU and mobi surprised fiff
Ddly your case will allow pop out some driver bay possible card back top pcu ,
-test it still works : connect the PSU cablt mobs CPU power ,case fan yet post beeps or led light up your,
-tech analysis:
2560×1600 screen gamii surplus frame ,R 14,00 flashiy GPU bios ,
CPU rendering performance:
Cindbdnxh r11,5;/index higher is better
-gaming/533
Direct x 11gaming performance
Dit3/frames per second higyis better
Stock biof/355
6970/408
-direct x 12 gaming performance
Shogun/ frames per second high better
Stock / 442
- hard ward reviews

-laptop repaired : screen replacement ,motherboard repair,ram,harddriver,CPU up grade replacement, batteries charge, domain registration, capped ,ucapped,internet ,fax ail voio,Intel B800,3gb ram /320g HDD,wireless ,/15,6" screen webcyfull keypad, camera chanej DVR
-ugradr ,repaired build PC,upgrade key component ,fixe PC proby fast ,set up a home network hardware
Byii componey process hard ward,tools,checking compatible CPU socket ,ram core components,installing motherboard access Ga - 88gm - ud2h,USB support ,installing processor ,installing a coin,install ram modukr power,installer graphic card ,PC's reason HD 6870,power am 1gb of ram
Installing internal hard drivfer 50gb optical driver part built up grading ,px lb 950S BLUE RAYY ,BLING MEDIA BUYB,CHOSE READING SPEED CD
- UNPACKING A POWE SUPPLY UNIT , SHOPIFY UNIY MODULE ,
Case and feature fan cooling
Up grade a PC choosing components open computer replace component challenge damage electricity,remove before process ,scenario compatible, completed desktop system,custising PC build configured a desktop PC ,budgr PC cash
- perpheraks gadgets,installing TV tuner ,HD hard ward connecu, hardware projey, windows,
-aoc LCD moniy,case OEM,case raidmax gaming,cattex networks cable and accesorie,cps pose back up solutions,g data antivirus, Kingston memory solutions,maxcam secury solution ,Microsoft, tower server cabinet end closure

Purpose

Purpose: word display manufacture
-Introduction technology, teasing compagny specialist in it components,
Required market effective technology solutions custome the product security surveillance soluy, networks,point sale server encloy it components,
-Mission: provide technology added value business,provide quality product , creation make different,
-valur : accountability commitment quality ,honest integrity,
-vision : to inspire purpose great place work member learn productive business ,
-partenera chanrk ,
Social but transformation bee compliant ..
Product Guide :
LCD monitor,screen size : 21,5"w/23,6,viewable image size : 546,86mm,display area : 476.(H),268,1@(v)mm, brigthness (typical):300cd/mm,contrast ratio (typical) 600000:1(DcR),response time (typical) 5ms, viewing angles: 170/160(car 10),max resolution:1920×1080@60hz,
HDCP compatible: yes, input signy: analogy RGB and dvu, user control menu, enter image ration source ,up auto / down power, power consumption power ,on < 49 stsndat<0,4w,wall mounted: vrsa 100mm, mechanical function tilt ,5-29,
Specii features : touch key USB ,by DcR glossy
-type qori - 335 case:type ATX Min case,motherboard: micro ATX , external ATX up (up to 13"x9,6),(p4ready)
-power supply : 400W Culp,P/s with 12cm fan (20+4 pin socket 775 ready)
,5,25" drive bays:3,3,5" drive hidden:8, expansion slots:7,I/o interface USB x 2,mic x 1,spk × 2 ,cooling fans front ,80mmx1, rear 80mmx1, dimension (DxwxH):410x182×425mm,M/t(cuft):1,73,
-frint mount USB ,audio, high,green LCD fan, external bat : 4,5,25"and 3×3,5",internal driver bays ,4× 3,5" HD,,system board ATX form facty ,13",×10,5 , expansion slots standard ATX 7,material SECC steel, dimensionnement: 52,25 x 20,5 x 45 cm (lxwxH)
- raidmax modular cabling system durable titanium mirror grade block wraps , mesh cable to mention 20 total power connector for all your computer, type : ATX12v,EPs 12v, maximum power:

730w,fans 135 m blue led fan ,PFC no ,main connector ,20+ 4 pin ,12 rails ,PCI e connector ,1×6 pin ,1×6+12 pin ,modular cabling support yes , energie efficient : up to 80 % ,over voltage protecyyes,
- network cable
Cat 5 e cabling: 500M solid,Uto,24AWG,0,5mm,4 pair,grey,,305 m flex or solide ,Uto,24 AWG,05 mm,4 pair grey
,,cat 6 cable .305 flex or solid Uto,24 AWG,o,57 mm,4 pair ,Gray ,to ,,
Cable tester digital tester ; cat 5e, ,
- toolkit: j-059 long nose pliers (159mm),hy-103B micro cutting pliers + 159mm),by -330 cable blade trividr,hyp -5022 wire stripper ,hy 568 telephone plier ,8p8x/rj-45,hy-324 punch down tool ,tape line ,2m knife, by 329 wire stripper economic hy 539 soldering iron 30w,cable tester ,tweezers 125 mm, crystal screwdriver, -+,module plug rj-45/7p8c x 6 PC, plastic box ,315x255×55mm, crimping tool,Rachel type dual crimping,punch down tools, wall boxes cat signle part RJ 45keystine jack ,surface mountable ,car 5 double ,RJ45 jack surface, carb
- connector ,boot sleeves ,RJ 45 cat micron connector ,standard , cables make female 15 pin VGA extenst available in ,2,0 m ,3.0 m,5./ ,Male to male 15 pin,
- 1000va /2000va rack mount ups ,
-patch panel 24 port Uto cat 5 e panek w / t back bar , 48 port Uto cat 5 e panel w/ back ,,
Battery voltage : 24 VDC, recharge tine ,8hours to 90% charger ,input voltage 110vac ,
.Or 220va c 25;,output wave from , pseudo wave , protection : output short city overload protection with current limiting,protection output circuit overload , 659 Va line interactive ups ,auto restart while AC recovy , provide overload protection ,compact size ligthb, automatically voltage regulator Ave , battery low voltage automatic , microprocessor control ,provide modem phone line surge protectors option , equipmt input voltage, building DC start functionalite enable ups , input commercial power range @45vac - 280vac ,AVR range 165 vac , frequency ,59 z +- 10%<, output commerce power : sine shared frequency AVR voltage range ,220vac auto sensing , transfer b,gross weight ,6,1kg ,size (mm) DxwxH,,260x96x135,,
-Data manufacture data security, security technology,new top security PC performance, high security,under completed undertectabke ,self fingers printy,maximum security record test winner ,, antivirus program enginee,anti spyware ,antipgising,antirookit,child protection ,system tuning , firewall,internet security,
Award technologie include double scan ,outbreak shield ,integrajitblocker ,special utility ,scan all compression file and archive formal, heuristic detection of virus, g data antivirus manage ,client ,premui support,,
- client security business ,g data antivirus management server,client ,internal desktop hard driver availt 1000gb
- value ram desktop memory, note book, server memory,,data traveler flash disj
Free agent notebook external hard drives store Dara ,synch data between PC ,back up fil,, digital broadcasting,
Serie projector , 3 projection system ,3 LCD panel ,1 lens projection system, resolution,RGB,1024,668,lam 190 ultra high pressure lamp,colorboutput 2000 lumen ,video input composite video , audio input ,
PCI , expression Serie , astaud performance,graphic processing ,stream processors 240, core clock 633mhz ,memory clock 2268 MHz ,memory type ,896 MB gdr3 ,memory interface 448-bit ,shader clock : 1404 MHz , bus type : pxu Express ,3 ways slu technologie,direct x support ,CUDA technologie 2 ,SLI technologie,Nvidia lumex ,dual link ,2 Nd generating architecture HDCP capable
Discovery vision

Purpose : Program analyse data,
- adabase ,storage data , association and work file access logic ,database modification and transaction ,introduction natural , accessing database , basic rwiten ,edit mask ,arrays , arithmetic more advance report condition statement , additional statemt data manupulr natural system command ,system variable ,session ,system functionalite ,input statement functionalite data area program editore Mao,, gierachir , network model, nucleus buffet poopl.i/0! Disk actual data ,parallel process , interface programme implentation methode control ,format buffer ,record ,search buffer ,value ,

- SQL data manipulation language , civil and pl statement written embedded , exce read logical ,natural acess operating system
- civil ,

,General control block ,file control block field descrip data storage space ,up date command record is added to file new ,up date field value in fult ,manage command ,
- database modification : add if new record selected exist , competition uptade case , user ,1 cancel days yes ,read employee file leave = 5 ,up date leave = 0!,,reserve days ,read reserve day 15;,read file 5 up file leave ,29, transacy concept ,the limited ,rejected accoun

Find statement,basic format t ,define data , employee ,personek I'd address ,end define ,number city address ,view
- break statement csalary record , department code namt
- compagny,

Definition module:
Employee
T l db name f Leng s d remark
Personal I'd ,first nane ,dare birth ,full address city ,zip ,post code ,telephone ,job , department , position current leave take ,leave booked ,leave start ,salary ,currency position

- data area editor: define variable with t data editor , define data ,emp ,name , surname,first name ,Dept ,

Incode ,
Date natural for Unix library name ,time software AG libraries , Unix fin ,,
Empl ,A,8;
Name,surname ,job title ,edit

Purpose:
Civil and development a program,
Program pli,code ,
- input output firm due suply ,name ,file ,record ,size implied decimal ,point indicate , name of output file record layout working ,storage nNe form ,outpy record number,
- hierachy diagram and pseudocode ,program logic planned hierachy diagram pseudocode indicate module , informs to plan step ,program ,stsdard , was ,I ,o ,start 200 first ,20@8,
- modular programming , program readability debugging,

Program readability: , picture value coded , working field , accut total ,
Program specification : position , 1-4 , field employee number ,name ,office number , telephone,,type numeri aplhabdt ,
- enter progi: also under sudej , save program , type word , compilation
- execute the program : the name input program computer :

: Report on disk in order to print later stage :
- debuggi on the program ;: if report is not correct ,logic error in program that correct , person number ,name office number repeat ,states was omitted from , in case error access ,
- instruct print report input for program data ..

Output program :
Record layout , take record , input ,file name yes ,input record ,implotr number ,20-30 0 employe name , 50- 60 office number , 60 telepy number,
- acubol : identy progr I'd program , Uthor ,date waruten ,date complied,

: This prohray print report with information aboyall information:
Enviy diviy: configuy PC IBM , object IBM,input ,output ,file control ,select employee file assign to disk ,orgNizTion is line sequential
Ms soft COBOL : calxuly ,computer es wage rounder = 1 hours,tariff, computer newrou d ,prepare line

, move @- to no ,
- Engineering comlGni increase
Number / hour/tariff ///current /////wage permitted//////new/// wage exceed /

Hierachy program
Work storage
Posityreddfune was position table , occur time
- procedure divisy , open input file report file ,error file, perform,read table time ,

Show in ZAR
Update

Sales by Item Tshingombe 1 August 2023 to 31 August 2023				
Item	Current Unit Price	Quantity Sold	Total	Average Price
0 - Fiscal fraude,Min,max value , energie tax , engine	25,000.00	1.0	25,000.00	25,000.00
000123 - Engineering chemistry, engineering physics, metall	2,000,000.00	3.0	6,000,000.00	2,000,000.00
00112345 - Instruct,health clean biotech ,food,vacum tend low	50,098.00	2.0	100,196.00	50,098.00
00112345098 - Instruct,inspect food take typical info,compos low	50,000.00	2.0	100,000.00	50,000.00
001123456 - Instruct,buotechno machine food cook,agro value	500,989.00	2.0	1,001,978.00	500,989.00
0011236398 - Instruct, biotechnology, food beverages, composite	50,000.00	2.0	100,000.00	50,000.00
001123984 - Instruct,typic food nutrie ph ,basic,acid 7, GRA v	500,989.00	2.0	1,001,978.00	500,989.00
001126867 - Instruct,food medecinal value assessment low,	5,009,898.00	2.0	10,019,796.00	5,009,898.00
00113456 - Instruct,biomicrobiologi,scanner biochem,low	50,009.00	2.0	100,018.00	50,009.00
001134567 - Instruct,agro pastoral tools equipment,low	50,000.00	1.0	50,000.00	50,000.00
00114356 - Instruct ,policy safe biotechnology skill dev,Lo	500,098.00	2.0	1,000,196.00	500,098.00
00122357 - Instruct,food value Assessment Portofilio low,osha	500,098.00	2.0	1,000,196.00	500,098.00
001334 - Engineering plastic ,metallurgie, geotechnical	2,345.00	5.0	11,725.00	2,345.00
0022345 - Instruct ,bio food manufac package assembly mec	5,090,098.00	1.0	5,090,098.00	5,090,098.00
002345 - Engineering, construction civil,mecanic,const elec	345,654.00	3.0	1,036,962.00	345,654.00
00526 - Instruct ,visa electrical ,meter energy, permit	25,000.00	1.0	25,000.00	25,000.00
00652 - Instruct,visa ,markdept , license fiscal,license	258,369.00	1.0	258,369.00	258,369.00
007200 - Instruct commission, council,visa passport id	25,000.00	1.0	25,000.00	25,000.00

0072096 - Instruc, bulletin,visa certificate,metering city	2,500.00	1.0	2,500.00	2,500.00
007236 - Instruct,com, I'd visa ,wegh,scale,size, plate sup	52,669.00	1.0	52,669.00	52,669.00
0072536 - Instruct com,plate fiscal,plate , empower,value	639,980.00	1.0	639,980.00	639,980.00
007255 - Instruct, commission,Eng visa passport,I'd supplie	200,690.00	1.0	200,690.00	200,690.00
00725669 - Instruc commis, municipality,visa engine supply	2,506,690.00	1.0	2,506,690.00	2,506,690.00
0072569 - Instruct, commission composit,visa I'd , supply	2,536,609.00	1.0	2,536,609.00	2,536,609.00
0072693 - Instruct,com,visa city meter ,plate , fiscality	528,809.00	1.0	528,809.00	528,809.00
0072698 - Instruct com, visa wehit plate number, fiscality	258,800.00	1.0	258,800.00	258,800.00
0092086 - Instruct info manage system , commissair, rulings	2,500.00	1.0	2,500.00	2,500.00
0092096 - Instruct, database drawing cad , commissair	2,589,658.00	1.0	2,589,658.00	2,589,658.00
00920996 - Instruct, office travelling , commissair rulings c	52,000.00	1.0	52,000.00	52,000.00
009258886 - Instruct , database intelligence robot, system	582,669.00	1.0	582,669.00	582,669.00
0092609 - Instruct, performance,info database code ,	56,800.00			

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et started with Google Play policy

- By Play Academy
- Published: Apr 5, 2023
-

Rating 1 star

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2 stars 3 stars 4 stars 5 stars

-

Average rating: 4.8 13 13 reviews

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Share Path

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Whether it's a way to track workouts, chart the nighttime stars, or build a new reality and battle for world domination, Google Play gives developers a platform to create engaging apps and games and build successful businesses. Key to that mission is maintaining the safety and integrity of Google Play as a trusted source of high quality apps for users to find and experience apps and games to enjoy. To support this effort and keep an even playing field for developers, Google Play has policies in place about what is and isn't allowed on Google Play.

Get Started

- **Google Play PolicyBytes - April 2023 policy updates**
    - 12 m
- **Disclosing user data deletion on the Data safety details page**
    - 5 m
- **Declare your use of foreground services**
    - 9 m
- **Best practices for integrating SDKs into your app or game**
    - 3 m
-

Policies and publishing on Google Play Video

  - 4 m

- **Get started with Google Play policies**

  - 8 m

- **Manage policy violations**

  - 5 m

- **How to handle a policy violation on Google Play Video**

  - 3 m

- **Restricted Content Play Policy Video**

- **Privacy, Deception and Device Abuse Play Policy Video**

  - 2 m

- **Spam and Minimum Functionality Play Policy Video**

- **Monetization and Ads Play Policy Video**
- **Store Listing and Promotion Play Policy Video**
- **Families Play Policy Video**
- **Intellectual Property (IP) Play Policy Video**
- **Impersonation Play Policy Video**
- **Malware Play Policy Video**
- **Mobile Unwanted Software (MUwS) Play Policy Video**
-
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- Add Path to Favorites
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to
me

Subject: Re: Documents wallet Portofilio,office Engineering project order management appointment project file order sale campagny meting tbrigade,edutech psscm... agenda office .PC safety wallet documents financial office
----- Message truncated -----

Information , intelligence information manager, perfect office, license agreement ,word perfect office ,word perfect, installing info Central,recommanded system requirements,question and answer, about installing ,taking quick making connection , contact manager info Central,using central contact manay,keeping track of people ,aff oersonek remember name , manipulation information screen how tab work ,sign tab saving lost ,customizi g information n,using call logging a telephone call , scheduled a telephone call ,using info book , viewing your information in an address book , printed , time management info Central ,using info Central for time keep track of appointment ,scheduling event ,using alarm to helph ,written tour a self task listed written note planing page wrapping ,closing task , housekeeping, connection with ,,
-document management with info Central, using documents keeping track of corresponding writing a letter, organisation memos other document ,opening editing related files connecting existing documents,using infocentral as files manager , manipulation files ,searching for files,
-moving information to and from info Central ,how info Central is different from database importing information from database or pim ,scanning the files tour hard disk ,moving information from one I base another ,,
- I base and template: using the Pre filled contents I bases using template, automobile record record , C's collection CD ,contact manager ,gardening ,home family ,stamp collection ,real estate student note,,
- license Granted of Rith software:
Restriction permission ,homeor portable computer provision ,limited warenty / limitation days, custome government , technical data,

WordPerfect ncall object discret ,name frien, click click call ,query ,call

, essential trade business entreprise ,point sale ,
Switch / base / switch per add / essential / trade //trade ////business/////entreprise/////// POS
Customer debator /60rand
Audit email statent journal ,print reprint invoice ,open account ,audit trial account account active overall , custome area interrs ,sales letter , multiple b,email sales documents sales documents number customer delivery check custom b,
2
. general switch : /600ranf
Unit / vat , return, custom , setup define report ,design report Omni automate , invoice ,export data from gride , multiple branches per company ,
3.job costing : emplitime sheet, job category,sub Jon , R200,
4.nominal general ledger : audit trail ,STD balance sheet report, journal,STD profit budget,
- sticker inventor : stock control base multiple, vin location,lost stock item, stock take ,stock,stocket ,stocket badge,,
-suppliet creditor :
Name , statement agent ,transaction supplier memos, supplier credit note supplies invoice, remittance , supplies line timr , settlement,email supplies documents,supplier ,no supplier back order extra cost invoice ,import purchase order ,full drill ,sars ,v
-connnection credible ,incredibly: wireless solutions , note book ,premii,,in store completed technical data recovery service ,able your data ,
Memory upgrat ,ram ,1 GB to 4 GB , 400mhz drrto 133-ddr, R. 500 to R 6000

Quick book,, product pay roll software , invoice quotation, payroll ,uif automatic journal quick book,general electronic ,fund transfer submission uif ,store access full emploie n,contrul periode ,rigth security control n,finanaciaj detsui ,define eaenubgb,access a number of standard report ,bank report , department summary boer week ,pate recalculate ,store access full emploitb,analyse customer supplier ,quick access to key data one place compagny n,access business,money in out money reminder ,cash flow report bookeping ,multiacces ,send email cash

Purpose: quick set up
Install
Feature : serial ,ata , power tray loading and ejection of disc , combination CD ,Rd - re, DVD - R/Re, DVD, , support region ,play back control phase ,support region secure disc technology, automatically buffer underrun error prevention technologie, support ligth direct label ,printed technology,
/ GH22lS30/GH22NS30
Ligth scribe / supported / not supported
- package item
Item / quantity
-intetnal super multi DVD writer /1
Record and authoring software/1

-neto in CD power procedure /1
MpEG - 2 software (power DVD)
-quick set up guide for super.multu DVD rerwiten/1
Data data cable /1
Data power Cale,
_ system environment PC:
.System requirements/ CPU : motherboard data pintuim IV ,3.2 or higher ,ram : 512 MB
.VGA card memory/ 128 MB or higher.
.hard disk : 20 GB or more free space , writer depending on the quantity,
. Interface :/ serial ata
.drive bay / 5.25 inch height b.
Power/5v ,+12 power socket , requireded,
Software requirements : window vista ,direct x ,9./
Recommand media manufacture/ CD-R ,CD re,dvdr,dvdre ,DVD+ r, DVD ram ,DVD ,,
Specifications item:
General /
Host interface : serial stsb,
Support disc; DVD ,
Supported secure diameter ,
Read write speed ,
Write DVD r
- item :
Performance data transfer rate , sustainable : CD ROM ,72000 my yte (48 mac) , DVD ROM ,22160! Kbyte , bursi SATA ,gen 1,15 GPS , average access CD ROM ,220 mec typic ,time , 140 mesec ,bufer capacity ,2 mbytr, MTB, 100000power on hour duty cycle 20%,
Environment level, when operating temperature ,5 c to 45 c , humidity ,@0% to 80 , product manufacturers to with radio interference EMC directive 2004/108/EC and low voltage directive 2006/95/EC,,class,caution class 3 b visible invisible Lazer operation radiation bexpisure beam

Student guide office automation: Holliday ,booking confirmation form: automatically field letter enclosed,squeezed memory.
- top 13 logiciel Gestion school management computer process top 13; tools product module , cluster,maintenance system product chronological system ,technical maintenance pedagogic accompagnemeny letsonsj,maintenance it information ,master reseller automation , intelligence workforce platform b,native cognitive skills vision ,tele operation maintenance field data forecast equipment fail algorithm,process and analyse data status robot components ,big data intensity process maintene Cr activities industrial fully productive , maintenance bue ,system food I formation entreprise keppi g database pc securite, protectionife cycle , up date application detection apply,ms CPU GPU ,ram clean system network ,space driver size , defragmentation,desintsllation of programme ,unistsllet , antivirus,task ,,

Tpm daily maintenance productive system policy plan compagny goaj

Purpose: analogy I/ o process control ,lab purpose : PLC ,API
Application of embedded controlet to real time algorithm emploie analogy input and anali output ,computer algorithm to implent closed loop processor form motor speed control , hoe feedback linearise ,non linear process and resultat in zero ,
Object : generate pwm output implentation variation motor supply voltage , implentation tachometer

operationel using pic 32 timer , develop the programmation code to Implementation pi control moving average digital filter,mage multiple interrupt driver system , monitor ,basic , suggest reading embeed mechatronics , microprocess hardware bbusy m X3 trainer board workstation ,PC t windows MC is,lunux ,23 DC motor with 5,vb,,,DC power supply software ,mp lab x, project tskey to read analogy compare to Implementation a pwu capture period , fundamental digital open loop and closed loop process,,unitprocess , process control ,automate process control engineering,d..
Display yes, signal conditioning yes, loop close yes computer algorithm yes , microprocessor yes ,DAC yes ,signal amp yes ,signal yes , process yes ,,open loop control loop process,DC motor speed VC pwm ,counter record position t3 co

Purpose: robot dynamic, kinematics and control , operator ,introduct , coordination ,lineare velocity , rotation matrics active passive rotattt composition representation Euler angles , angular , MATLAB cad:
axb=[a1,a2,a,3]×[b1,b2,b,3]=[a]×[b]=[o,a3,a2,,a3,0,a1,a2,a1,0]<, angular velocity acceleration b, angle ,z,y,x..yy,z,, kinematics planetary , 3 dog Robi arm ,generalized coordinator ,are Q=(Q,w2,Q,3)=(alpha 1,alpha2,alpha3,) effector position and orientation ,x €(Q)=(x€o(Q),x€R(Q),,, X €(q)=(x,z)=(1,sin(Q)+l2sin(q1+q2)+i3(q1+,q2,+Q3), Io+u1cos(q1)+i2 cos (q1+qq)+ cos (q1+q2+Q3),,x€r(q)=x€r(w)=q1+q2+Q3+

Function ,ph = get eulu angle ,x,z,y from rotation matrix ,c % GETU Langa x,j z from tion matric (c) extract x,y,z Euler Ngler form ,% rotatricr ,% author ,x y = a tan 2 (-+2,3),+(3,3),,y = a tan 2;(c @,3),sar + cc, 1), 2 (1,2)"2,ph = [x,y,z]<

Purpose: PC job , path , measure availability, availability= operation time/load time,,
- loading Times - dow time / loading time,,operating = 0,5 minute×100/0,8 minute = 460. Minute,,
- operating = 0,5 minute × 100/0,8 minute=62,5%, net operating rate = actual processing/ operation time ..
= Process amount × actual cycle time / time time , net operation,
Rate = 400 item × 0,8 minute × 100/400 minute= 80% ,, performance , efficient = net , process amount × actually cycle time × ideal cycle time/ actual cycle time,
Processes amount x ideal cycle time / operation time ,
= 400(item) × 0,5 minute /400×100= 50%, 0,625 ÷0,80×100=50%,
- A . Working hour per day , 60 Min ×8h=480 Mon, B plane down time schedule ,c: load time per minute break down ,20 minute , step ,
E: operationel time ,day =c-D=400 Min ,G : outlet day = 400 item , H : Raye of quality products ,98% ,,I : ideal cycle time 0,5 Min item , j : actual cycle time= 0,8 Min , f: actually cycle time = 0,8 Min it's , f actual processing time = E/c ,x 100
M : operating rate = I/j × 100=0,5/0,8/100=62,56,
N: net operating rate = rate F/ E x 100= (o,8)(400×100, l performance efficiencye m x n× 100=0,6#×0,800×100=50, overall equipmt effect = txlh ,,,network control critical path work , organisation chart ,flow process chart ,key , operationel,transport ,inspection ,storage ,,, load time operating time ,net operating Time yes , valuable time yes ,, equpmebt faillure ,adjustable, minor stoppage defect process,,
Calcul overall equipmt, availability= load time diameter ×100/load time,, available = 469 Min,,460 Min -60 Min × 100/load time ,, available = 460 Min -60 Min/460m ×100=876,, performance= there cycle time × process / time operating ,, performance efficiency= 0,5 Min × 400 unit× 100/400=50%,,, Overall equipment effect= availability × performance efficient × rate of quality,,
- Design test p.p,,dea

Test design ,3 or design test p.p maintence p.p,/ link maintence wire assembly maintence, order an , purchase, order and purchase
Power empower project , command project process
Duty cycle ,duty classic, operationel component data cycle duty ,
N = operation time at constant load max , maximum, temperature, operation at constant load St ,n =™time at rest flux max = maximum temperature, attained load electrical losses cycle duration, time ,start , acceleration time n , operation time at constant load ,if of electric braking ,time at rest flux max ,sequence duty energy inertie, driver operationel service factor = 1.0 means,: frame size quantity power : damage disconnect input power to mazimun at no load in dB , 60 Hz ,poles
-engineering electrical motor ,lecture disck ,,start delta direct load transform ,,
Principle command ,alforigrame sequence diagram:
Starting with start Delta dusibleb,control F1,f,2,f,3',t1 control transformer k# , contactor ft@ ,overload ,relay h control buttons kt@- time , motor optionak ,motor optional accessories phase relay ,Mmeter , voltmeter ohm metre start delta switch , start delta for output , 220v ,380v , fusible ,, F.23 control fuse t2 control transformer k1,.k2.,j3 ,contactor ft@ ,0verload relay ,control options ,accesorie ,phase failed relay ,operation dusk , ,,

- wath happen switch off on circuit :

- automatic lineare, performance b, correction advance ,retard ,,
Regime transitaire ,system lineaire echelon, u(t) = consts ,yv(t) detector,
Y(t) - instant to ,x(t),EST v <oxx (t) ,,
y(t)=a.u(t),,y(t)=a.u(t.t),,,y(t)=,system stable , systeminears principal support, a.u1(t)+by(t)-s St,linear ,,,
-equation electric system ,,
VE= RI+vs ,system ,RC,dv Constance system lineare Laplace , y(t)=(u.h).(t),,

-radio technic:
Input signal or port yes module yes output signal module ,
Type modulation, u= u .sin (w.t+alpha),,
Value instant u, u value cret ,a = 2.f, ,u ft
Signal modulator ,module am signaj, oscillator portets,dephase 90 , signal bmodule an
- system dipole ,:U(t)=R.t(I)..conductor / bytb,G= IR, sirmence , system linear ,non lineare , Fae+ b = a few+ b fser ,signal input , output ,system , filter box input ,output ,x (t) - y(t) s, system linear ,hb(h.t) ,, y (t) = z + 1 , HT (t: u) , impulsion reponsrb,x(t) ,,peig d diract ,circuit transfer input output , h (s) , x (t)= 0 , y y (y) = H (s)x(t),,y(t)= yo.j = x (t),,
Variable x= y=s(s), ,,m1,n=,time,x(t) signal continue, signal siscret , period instann,x power,,transformer forever ,x(t) ,TF x ,, measure frequency, sum ,x (q) ,,linearity ,TF(x+y)=TF(x) +TF(y),,
Time frequency,decalsgrb, TF = real time strictment passif ,,TF,TF(x (ti to)
- derivay note x(t),DX =St ,TF [xo(t)]z+1,,
Integration x (t) derive exponent:
Dilation temo Freq, TF(x(t(t)=z+1,1
RF+x(t)],TF,, conjugate comply calculate, tfx (t) ,signal real ,x(t(=x(t),,
- transformer ,fans f 2 function derivable interval [a,b],,derivation contrate ,for + t) g + GT) dt = [ft) (GT) bib,zba ,,f(tb) go (go) [f(t)g.(t).b,,a = f(b).g(b).I f(a).g(a)..
- transfort Fourier ,transformer ,
TF[xoy(+t)..,,,TF(x a y) (t) = z+1,, z -1,1 Hz ,,x(u).y ,,x(t)=X1(t)+jx2(t),,

Impulsion diract ,,I(t) impulsion diract transformer limited , signal finie , retention T f [xoy(t)], neutral element ,,

-Signal information package database analyse lab Matalab : sinus peak ,control loop
-Signal information management , signal management recruitment signal radio control alpha Bravo Charlie informers recruitment signal time discret ,
Signal communication skill admiss persal signal radar detector signal information data source criminel
Input signal information system manage value x f(x) variable ,or f(y) ,research methode investigation signal, traffic control signal management information f(x), ,,signal traffic control loop x saturation way over load way operationel traffic stop sign ligthning f(x), signal relation vehicle circulation vehicular linearity TF (x+y) input compare to way and gate evidence outfuo library trial separe TF(x)+TF (y) ,incidence speed collineare, ,,informer asssessment in order Manuel electronics system derivation conduct misconduct integration system by,,
Signal information real system management investigate

Information management system,security ,2,3cctv information duty ,2,9rado security information,zone security alarm detector response control room supervisor Assessment management,information metal detector 2alarm signal radio, compare linear or non lineare,,information system management police docket system Manuel compare evidence supplies sabs close delivery compare supply scaling police marking information marks process CCTV police alarm police calender daily manage court warrenty,,input alarm x ,clocking ocloc time t(t) ,,, y(x) ,variable , statistics report ,source data crime report ,occurs ,research integrity ,research deviation ,research transfer equation linear synchronouse system ,,intelligence system

[TYPE THE COMPANY NAME]

[Type the document title]

[Type the document subtitle]

pc21

[Pick the date]

[Type the abstract of the document here. The abstract is typically a short summary of the contents of the document. Type the abstract of the document here. The abstract is typically a short summary of the contents of the document.]

Dashboard

keyboard_arrow_right

Google Wallet API
Issuer ID: 3388000000022260070

info

More about Google Wallet API

You're in demo mode

In demo mode you can create and test passes before they go live. When you’re ready to publish a pass, request publishing access. Learn more

Get publishing access

0/3 completed, 0%

0/3 completed

create

Create a class

You must create a class in demo mode to request publishing access.

business_center

Complete your business profile

You must have an approved business profile to request publishing access.

fact_checked

Request publishing access

Create a class

A class is a template for your passes. Create your first class, to start publishing passes.

cloud

Register for access to the REST API

Create a Developer user account using your Service Account Email address.

DashboardBusiness Profile*code*Google Pay API*code*Google Wallet APIUsers

Help Center

Contact support

Send feedback

Google Pay & Wallet Console

Additional Terms of ServicePrivacyBusiness Policies

Dashboard

keyboard_arrow_right

Business Profile

info

More about Business Profile

article

Your business profile is under review. If this status has not changed after one day, please contact support.

Business identity

Select or create a payments profile to identify your business across Google. Learn more

Business information

Logo

info

Help your customers recognize your business on Google. For businesses with basic information, the Business Profile will highlight the logo.

Min resolution: 640 x 640 px. Max resolution: 1024 x 1024 px. Max size: 5MB. To see where Google may display this logo, please refer to the Google Pay & Wallet Console Additional Terms of Service.

Basics

Public business name

tshingombe tshitadi

Merchant Category Code (MCC)

Miscellaneous Apparel and Accessory Shops (5699)

Business phone (optional)

+27 72 529 8946

Customer support

Corporate website

https://wwwtshingombe.com

Customer support URL

https://wwwtshingombe.com

Customer support email

tshingombefiston@gmail.com

Customer support phone

+27 72 529 8946

loading

loading

loading

loading

no subject)

Inbox

Google Wallet Support Team <google-wallet-passes-support@google.com>

12:26 PM (4 minutes ago)

to
me

Thank you for contacting the Google Wallet API support team. We will get back to you within 1 business day.

Our operational hours are:
Monday - Friday
8:00 AM - 5:00 PM PT

Best regards,

The Google Wallet API Support Team

Re: Account Confirmation for Google Play Academy Certificates

Inbox

TSHINGOMBEKB TSHITADI	Fri, Jul 28, 9:51 PM

to donotreply, me, tshingombetshitadi,
tshitaditshingombe

On Fri, 28 Jul 2023, 21:29 , <donotreply@webassessor.com> wrote:

Hello Fiston Tshingombe,

Welcome! You have been set up with an account in the Webassessor exam delivery system. You will be able to register and take GooglePlay certifications using this system.

Access the related training and more at https://play.google.com/academy/certificate

Your login is: tshingombekb@gmail.com

Please follow these steps to register your exam(s):

1. Log in to access Webassessor: https://www.webassessor.com/GOOGLEPLAY
2. Then click the "Register for an Exam" tab.
3. Select the available exam for "Google Play Store Optimization", and click "Get Now".
4. Review the exam details, and click "Check Out".
5. Then click the "My Assessments" tab.
6. Click the "Launch" button to the right of the exam name to start.

To reset your password in the future, please click the link below, enter your login (provided above) and click "Submit". You will receive an email with a link to update your password.
https://www.webassessor.com/wa.do?page=forgotPassword&branding=GOOGLEPLAY

Once you have set your password, use the following link to access Webassessor:
https://www.webassessor.com/GOOGLEPLAY

Please do not reply to this e-mail as it is automatically generated from our exam delivery system.
If you have questions, please contact GooglePlay at play-certificate-support@google.com.

Thanks
The Google Play Academy Team

Re: fiston tshingombe invited you to the Google Pay & Wallet Console

Inbox

TSHINGOMBEKB TSHITADI	Fri, Jul 28, 8:42 AM

to Google, me,
tshingombe

On Tue, 25 Jul 2023, 13:50 Google Pay, <googlepay-noreply@google.com> wrote:

> Accept your invitation inside.

Welcome to the Google Pay & Wallet Console

Hello TSHINGOMBEKB TSHITADI,

fiston tshingombe (tshingombe520@gmail.com) has invited you to the Google Pay & Wallet Console for Tshingombe.

Accept invitation

Need more help?

See our FAQ page for additional support.

Was this email helpful?

© 2023 Google LLC,
1600 Amphitheatre Parkway,
Mountain View, CA 94043

You received this welcome email because you have been added to an account in the Google Pay & Wallet Console.

TSHINGOMBEKB TSHITADI

Sat, Jul 29, 8:46 PM

to **tshingombetshitadi**, Google, TSHINGOMBEKB, me, tshingombe

Create a Gift Card Class

General

Issuer Name

*

Class ID

*

Status

Multiple devices and holders allowed status

Geo locations (latitude, longitude) pairs

Country Code

Card Art

Logo Image URL

*

Hero Image URL

Word Mark Image URL

Background Color (Hex)

Homepage URL

URL Label

URL

Callback Settings

Callback URL

Update request URL

Redemption Issuers

Redemption Issuer

Smart Tap Settings

Enable Smart Tap?

☐

Image Modules

Image Module

1

Image URL

Link Modules

Link Module

1

Link Label

Link URL

Text Modules

Messages

Message

1

Bill INV-0026 from Tshingombe is due

Inbox

fiston tshingombe <invoicereminders@post.xero.com> 7:00 AM (4 hours ago)

to
me

View invoice 10,125,676.40 due Aug 5, 2023
INV-0026

Hi tshingombe,

Thanks for working with us. Your bill for R10,125,676.40 was due on Aug 5, 2023.

If you've already paid it, please ignore this email and sorry for bothering you. If you've not paid it, please do so as soon as possible.

To view your bill visit https://in.xero.com/B0UJ3s9QVmDY8bFa4l2kIVMEzYjTqpZ4VQxM3UDu.

If you've got any questions, or want to arrange alternative payment don't hesitate to get in touch.

Thanks
Tshingombe

Bill INV-0008 from Tshingombe is due

Inbox

fiston tshingombe <invoicereminders@post.xero.com> 7:00 AM (4 hours ago)

to
me

View invoice 340,000,000.00 due Jul 29, 2023
INV-0008

Hi ,

Thanks for working with us. Your bill for R340,000,000.00 was due on Jul 29, 2023.

If you've already paid it, please ignore this email and sorry for bothering you. If you've not paid it, please do so as soon as possible.

To view your bill visit https://in.xero.com/tyD84UAeuk6vnl9xlLNqCkQIMf5YhdMzsQzozO1I.

If you've got any questions, or want to arrange alternative payment don't hesitate to get in touch.

Thanks
Tshingombe

Download PDF

Bill INV-0017 from Tshingombe is due

Inbox

fiston tshingombe
<invoicereminders@post.xero.com>

Fri, Aug 11, 7:00 AM (1 day ago)

to
me

View invoice

495,785,952.30 due Aug 4, 2023
INV-0017

Hi tshingombe,

Thanks for working with us. Your bill for R495,785,952.30 was due on Aug 4, 2023.

If you've already paid it, please ignore this email and sorry for bothering you. If you've not paid it, please do so as soon as possible.

To view your bill visit https://in.xero.com/T2oZi7UlBo7lFkFcpHaU1k51smDfzsDYuexFs8Ex.

If you've got any questions, or want to arrange alternative payment don't hesitate to get in touch.

Thanks
Tshingombe

Bill INV-0014 from Tshingombe is due

Inbox

fiston tshingombe
<invoicereminders@post.xero.com>

Fri, Aug 11, 7:00 AM (1 day ago)

to
me

View invoice

6,826,877,014.80 due Aug 4, 2023
INV-0014

Hi tshingombe,

Thanks for working with us. Your bill for R6,826,877,014.80 was due on Aug 4, 2023.

If you've already paid it, please ignore this email and sorry for bothering you. If you've not paid it, please do so as soon as possible.

To view your bill visit https://in.xero.com/CYoTdr6ILJz9UVbp7qEI64q3INYU3seHuzZ8pUiC.

If you've got any questions, or want to arrange alternative payment don't hesitate to get in touch.

Thanks
Tshingombe

Download PDF

Bill INV-0012 from Tshingombe is due

Inbox

fiston tshingombe
<invoicereminders@post.xero.com>

Fri, Aug 11, 7:00 AM (1 day ago)

to
me

View invoice

6,054,596.00 due Aug 4, 2023
INV-0012

Hi tshingombe,

Thanks for working with us. Your bill for R6,054,596.00 was due on Aug 4, 2023.

If you've already paid it, please ignore this email and sorry for bothering you. If you've not paid it, please do so as soon as possible.

To view your bill visit
https://in.xero.com/K6JTOHhMtzkiUtHOMBvYDG76tlFKx67PUjP8n9h2.

If you've got any questions, or want to arrange alternative payment don't hesitate to get in touch.

Thanks
Tshingombe

Download PDF

Invoice INV-0047 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Fri, Aug 11, 5:19 PM (18 hours ago)

to me,
mmsale

Tshingombe

View invoice R67,729,158.00 due 11 Aug
INV-0047

Hi,

Here's invoice INV-0047 for ZAR 67,729,158.00.

The amount outstanding of ZAR 67,729,158.00 is due on 11 Aug 2023.

View your bill online:
https://in.xero.com/XEJTRggHZX8IDozNGEFuXi3Y9QibFrdddcpWVzqo

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Bill INV-0005 from Tshingombe is due

Inbox

fiston tshingombe <invoicereminders@post.xero.com>

Thu, Aug 10, 7:00 AM (2 days ago)

to
me

View invoice 20,000.00 due Jul 27, 2023
INV-0005

Hi ,

Thanks for working with us. Your bill for R20,000.00 was due on Jul 27, 2023.

If you've already paid it, please ignore this email and sorry for bothering you. If you've not paid it, please do so as soon as possible.

To view your bill visit https://in.xero.com/Dzul8TWlsjQNub5TzOjTa4ULwEJ7aVuCbB5FcspD.

If you've got any questions, or want to arrange alternative payment don't hesitate to get in touch.

Thanks
Tshingombe

TAX INVOICE
mmsale@shoprite.co.za
Invoice Date
30 Jul 2023
Invoice Number
INV-0013
Reference
3500
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA

Description	**Quantity**	**Unit Price**	**VAT**	**Amount ZAR**
Implementation engineering electrical circular tra	1.00	2,223.00	No VAT	2,223.00
Subtotal				2,223.00

TOTAL VAT 0.00
TOTAL ZAR 2,223.00
Due Date: 3 Aug 2023

Re: South Africa Career Questionnaire Results

Inbox

T

TSHINGOMBEKB TSHITADI	Mon, Jul 17, 7:36 PM

to autoresponder, tshingombe, me, tshingombetshitadi

On Sun, 16 Jul 2023, 15:33 , <autoresponder@pacecareers.com> wrote:
Hi Tshingombe Tshitadi,

Thank you for completing the South Africa Career Questionnaire at https://www.gostudy.net///questionnaire

You can click on your highest fields to get more information on suitable careers.

Career Questionnaire Results

Management and Planning (100%)	100%
Health Science (100%)	100%
Trades (100%)	100%
Marketing and Sales (100%)	100%
Law Enforcement (100%)	100%

Language and Communication (100%)	100%
Science and Mathematics (100%)	100%
Health Support Services (100%)	100%
Sport (100%)	100%
Information Technology (100%)	100%
General Services (100%)	100%
Law (100%)	100%
Plants and Animals (100%)	100%
Social Sciences (100%)	100%
Crafts (100%)	100%
Engineering (100%)	100%
Clerical and Secretarial (100%)	100%
Educational and Social Support (100%)	100%
Finance (100%)	100%
Performing Arts (80%)	80%
Applied and Visual Art (80%)	80%

You can redo your Career Questionnaire by clicking here : https://www.gostudy.net//questionnaire

Quote QU-0001 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Thu, Jul 27,
3:35 PM

to
me

Tshingombe

Hi,

Thank you for your enquiry.

Here's quote QU-0001 for ZAR 20,000.00.

View your quote online:
https://in.xero.com/qpWLnYPr55HThr9D2YR1VUiYEXuIVp0J5vKDXqVi

From your online quote you can accept, decline, comment or print.

If you have any questions, please let us know.

Thanks,
Tshingombe

Terms
3years study business development executive management system engineering process

QUOTE
mmsale@shoprite.co.za
Date
27 Jul 2023
Quote Number
QU-0001
Tshingombe

Description	Quantity	Unit Price	VAT	Amount ZAR
Business engineering	1.00	20,000.00	No VAT	20,000.00

Subtotal 20,000.00
TOTAL VAT 0.00
TOTAL ZAR 20,000.00
Terms
3years study business development executive management system engineering process

Quote QU-0002 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Sat, Jul 29, 2:43 PM

to
me

Tshingombe

Hi,

Thank you for your enquiry.

Here's quote QU-0002 for ZAR 340,000,000.00.

View your quote online:
https://in.xero.com/tdcKSZuiqN8D8pcsirKZKuOpaydDC4EeJ14Q6D41

From your online quote you can accept, decline, comment or print.

If you have any questions, please let us know.

Thanks,
Tshingombe

Terms
Subcontractors engineering electrical, manufacture , installation design dimensions,policy asssessment

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
QUOTE
mmsale@shoprite.co.za
Date
29 Jul 2023
Expiry
5 Aug 2023
Quote Number
QU-0002
Reference
2000
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price Discount VAT Amount ZAR
Fit, appliance electrical house home ,
industrial
200.00 2,000,000.00 15.00% No VAT 340,000,000.00
Subtotal (includes a discount of
60,000,000.00)
340,000,000.00
TOTAL VAT 0.00
TOTAL ZAR 340,000,000.00
Terms

Subcontractors engineering electrical, manufacture , installation design dimensions,policy asssessment
Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.

Quote QU-0005 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Sun, Jul 30, 8:40 PM

to
me

Tshingombe

Hi,

Thank you for your enquiry.

Here's quote QU-0005 for ZAR 2,223.00.

View your quote online:
https://in.xero.com/zSDucbUtRDp8UsU2fPNsv28pwWIAf2Uw0ebdxCyj

From your online quote you can accept, decline, comment or print.

If you have any questions, please let us know.

Thanks,
Tshingombe

Terms
Education technology

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
QUOTE
mmsale@shoprite.co.za
Date
30 Jul 2023
Expiry
13 Aug 2023
Quote Number
QU-0005
Reference
5000
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA

Description Quantity Unit Price VAT Amount ZAR
Implementation engineering electrical circular tra 1.00 2,223.00 No VAT 2,223.00
Subtotal 2,223.00
TOTAL VAT 0.00
TOTAL ZAR 2,223.00
Terms
Education technology
Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.

Bill INV-0031 from Tshingombe is due

Inbox

fiston tshingombe
<invoicereminders@post.xero.com>

7:00 AM (3 hours
ago)

to
me

View invoice

26,268,387.40 due Aug 6, 2023
INV-0031

Hi tshingombe,

Thanks for working with us. Your bill for R26,268,387.40 was due on Aug 6, 2023.

If you've already paid it, please ignore this email and sorry for bothering you. If you've not paid it, please do so as soon as possible.

To view your bill visit
https://in.xero.com/Scv0TfYSRYsR99Tt6rj3DB5JB9vXfVCFtfXeDu23.

If you've got any questions, or want to arrange alternative payment don't hesitate to get in touch.

Thanks
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
TAX INVOICE
mmsale@shoprite.co.za
Invoice Date
6 Aug 2023
Invoice Number
INV-0031
Reference
2500
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Instruct info manage system , commissair, rulings 1.00 2,500.00 15% 2,500.00
Instruct,information processing commissair marks 1.00 25,000.00 15% 25,000.00
Instruct,adm skill communication, commissair mark 1.00 2,699,389.00 15% 2,699,389.00

Instruct, office travelling , commissair rulings c 1.00 52,000.00 15% 52,000.00
Instruct, performance,info database code , 1.00 56,800.00 15% 56,800.00
Instruct, info data base logic control 1.00 25,899.00 15% 25,899.00
Instruct,info data base info , creation file , doc 1.00 258,000.00 15% 258,000.00
Instruct , database operating system , computer 1.00 258,009.00 15% 258,009.00
Instruct, database treatment text table creat , 1.00 2,580,996.00 15% 2,580,996.00
Instruct, database creation ,access key lock commi 1.00 256,690.00 15% 256,690.00
Instruct, code database visuel basic, commissair 1.00 258,639.00 15% 258,639.00
Instruct, database drawing cad , commissair 1.00 2,589,658.00 15% 2,589,658.00
Instruct,code database image 1.00 536,989.00 15% 536,989.00
Instruct, database Unix web mail office 1.00 2,589,636.00 15% 2,589,636.00
Instruct , database intelligence robot, system 1.00 582,669.00 15% 582,669.00
Instruct,databee language machine ,it manufac 1.00 536,999.00 15% 536,999.00
Instruct, data cc+, computer sale cash ,note 1.00 258,996.00 15% 258,996.00
Instruct, cybersecurity,policy safety database 1.00 2,589,963.00 15% 2,589,963.00
Instruct, database, creat hard word sofward, 1.00 25,996.00 15% 25,996.00
Instruc,data initial unity central ,logic arithmet 1.00 2,500,693.00 15% 2,500,693.00
Instruct, database screen VGA ,pixel svga, code 1.00 2,580,996.00 15% 2,580,996.00
Instruct, database display mouse , module monitor 1.00 36,500.00 15% 36,500.00
,instruct ,printer ,scanner wizard database, 1.00 258,906.00 15% 258,906.00
Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
Description Quantity Unit Price VAT Amount ZAR
Instruct, database cable port USB,fibre optic,pin 1.00 258,909.00 15% 258,909.00
Instruct,database mathematics informatique, 1.00 52,006.00 15% 52,006.00
Instruct, technology info ,actual view open .ms 1.00 250,069.00 15% 250,069.00
Instruct, trainer PC info path office professional 1.00 693,369.00 15% 693,369.00
Instruct database ,trainer circulum, 1.00 25,800.00 15% 25,800.00
Subtotal 22,842,076.00
TOTAL VAT 3,426,311.40
TOTAL ZAR 26,268,387.40
Due Date: 6 Aug 2023

Bill INV-0013 from Tshingombe is due

Inbox

fiston tshingombe
<invoicereminders@post.xero.com>

Thu, Aug 10, 7:00 AM (3
days ago)

to
me

View invoice 2,223.00 due Aug 3, 2023
INV-0013

Hi tshingombe,

Thanks for working with us. Your bill for R2,223.00 was due on Aug 3, 2023.

If you've already paid it, please ignore this email and sorry for bothering you. If you've not paid it, please do so as soon as possible.

To view your bill visit
https://in.xero.com/OSx3vKqj84WcZtynrpg53DFiJLD6baABpzOIV1Ha.

If you've got any questions, or want to arrange alternative payment don't hesitate to get in touch.

Thanks
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
TAX INVOICE
mmsale@shoprite.co.za
Invoice Date
30 Jul 2023
Invoice Number
INV-0013
Reference
3500
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Implementation engineering electrical circular tra 1.00 2,223.00 No VAT 2,223.00
Subtotal 2,223.00
TOTAL VAT 0.00
TOTAL ZAR 2,223.00
Due Date: 3 Aug 2023

Statement from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Fri, Aug 11, 4:59 PM (2 days ago)

to
me

Tshingombe

Hi,

Here's your statement for the period 1 Jul 2023 to 31 Jul 2023.

If you have any questions, please let us know.

Thanks,
Tshingombe

One attachment • Scanned by Gmail
Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
STATEMENT - Activity
mmsale@shoprite.co.za
From Date
1 Jul 2023
To Date
31 Jul 2023
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Date Activity Reference Due Date Invoice Amount Payments Balance ZAR
1 Jul 2023 Opening Balance 0.00
26 Jul 2023 Invoice # INV-0001 520 26 Jul 2023 2,300.00 2,300.00
27 Jul 2023 Invoice # INV-0005 QU-0001 27 Jul 2023 20,000.00 22,300.00
29 Jul 2023 Invoice # INV-0008 2000 29 Jul 2023 340,000,000.00 340,022,300.00
30 Jul 2023 Invoice # INV-0012 5000 4 Aug 2023 6,054,596.00 346,076,896.00
30 Jul 2023 Invoice # INV-0013 3500 3 Aug 2023 2,223.00 346,079,119.00
31 Jul 2023 Invoice # INV-0014 2000 4 Aug 2023 6,826,877,014.80 7,172,956,133.80
BALANCE DUE ZAR 7,172,956,133.80

Invoice INV-0003 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Fri, Aug 11, 4:58 PM (2 days ago)

to
me

Tshingombe

Hi,

Here's invoice INV-0003 for ZAR 120,920.00.

The amount outstanding of ZAR 120,920.00 is due on 27 Jul 2023.

View your bill online: https://in.xero.com/gGSL7p4IrgX8Yiz7ikq37XXJnGk8Z7vAyDmzR7lj

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
DRAFT INVOICE
mmsale@shoprite.co.za
Invoice Date
27 Jul 2023
Invoice Number
INV-0003
Reference
520
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA

Description	Quantity	Unit Price	VAT	Amount ZAR
Marketing engineering	1.00	400.00	15%	400.00
Marketing engineering	1.00	400.00	15%	400.00
Business engineering	1.00	20,000.00	No VAT	20,000.00
Business engineering	1.00	20,000.00	No VAT	20,000.00
Business engineering	1.00	20,000.00	No VAT	20,000.00
Business engineering	1.00	20,000.00	No VAT	20,000.00
Business engineering	1.00	20,000.00	No VAT	20,000.00
Business engineering	1.00	20,000.00	No VAT	20,000.00

Subtotal 120,800.00
TOTAL VAT 120.00
TOTAL ZAR 120,920.00
Due Date: 27 Jul 2023

Invoice INV-0006 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Fri, Aug 11, 4:58 PM (2 days ago)

to
me

Tshingombe

Hi,

Here's invoice INV-0006 for ZAR 73,172.00.

The amount outstanding of ZAR 73,172.00 is due on 28 Jul 2023.

View your bill online:
https://in.xero.com/AzqOT99Gg0hZfJEtuW1ZXRb3ecYi3VWKoffczOgO

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

One attachment • Scanned by Gmail
Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
DRAFT INVOICE
mmsale@shoprite.co.za
Invoice Date
28 Jul 2023
Invoice Number
INV-0006
Reference
520
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA

Description	Quantity	Unit Price	VAT	Amount ZAR
Engineering electrical database	1.00	6,589.00	No VAT	6,589.00
Engineering electrical database	1.00	6,589.00	No VAT	6,589.00
Engineering electrical database	1.00	6,589.00	No VAT	6,589.00
Engineering electrical database	1.00	6,589.00	No VAT	6,589.00
Marketing engineering	1.00	400.00	15%	400.00
Business engineering	1.00	20,000.00	No VAT	20,000.00
Engineering electrical database	1.00	6,589.00	No VAT	6,589.00
Engineering electrical database	1.00	6,589.00	No VAT	6,589.00
Engineering electrical database	1.00	6,589.00	No VAT	6,589.00
Engineering electrical database	1.00	6,589.00	No VAT	6,589.00

Subtotal 73,112.00
TOTAL VAT 60.00

TOTAL ZAR 73,172.00
Due Date: 28 Jul 2023

Invoice INV-0007 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com> Fri, Aug 11, 4:58 PM (2 days ago)

to
me

Tshingombe

Hi,

Here's invoice INV-0007 for ZAR 230,909.00.

The amount outstanding of ZAR 230,909.00 is due on 02 Jul 2023.

View your bill online:
https://in.xero.com/z9x5wh7yB5ICogVcanEasvJEdDm7bGyz3IG6VwRf

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
DRAFT INVOICE
mmsale@shoprite.co.za
Invoice Date
29 Jul 2023
Invoice Number
INV-0007
Reference
520
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Engineering electrical database 1.00 6,589.00 No VAT 6,589.00
Electrical engineering sub contractor rate 1.00 90,000.00 No VAT 90,000.00
Basic distribution board installation ,3 phase, 1 1.00 12,000.00 15% 12,000.00

3 phase ligthning protection
Fit ripple relay geyser,fit sub board to out 1.00 1,000.00 15% 1,000.00
Fit ripple relay geyser,fit sub board to out 1.00 1,000.00 15% 1,000.00
Supply and lay 3 phase cable.from boundary .metre 1.00 1,000.00 15% 1,000.00
Fit ripple relay geyser,fit sub board to out 1.00 1,000.00 15% 1,000.00
Marketing engineering 1.00 400.00 15% 400.00
Fit, appliance electrical house home , industrial
Manufacture engineering dimensioning low, high vol 1.00 100,000.00 15% 100,000.00
Marketing engineering 1.00 400.00 15% 400.00
Subtotal 213,389.00
TOTAL VAT 17,520.00
TOTAL ZAR 230,909.00
Due Date: 2 Jul 2023

Invoice INV-0009 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Fri, Aug 11, 4:58 PM (2 days ago)

to
me

Tshingombe

Hi,

Here's invoice INV-0009 for ZAR 340,356,560.00.

The amount outstanding of ZAR 340,356,560.00 is due on 29 Jul 2023.

View your bill online:
https://in.xero.com/KlTDAqq98cVB5VxZYzrJ2uA8GN86p8RljRWlEGmS

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
DRAFT INVOICE
mmsale@shoprite.co.za
Invoice Date
29 Jul 2023
Invoice Number
INV-0009

Reference
2000
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price Discount VAT Amount ZAR
Fit, appliance electrical house home ,
industrial
200.00 2,000,000.00 15.00% No VAT 340,000,000.00
Manufacture engineering dimensioning low,
high vol
1.00 100,000.00 15% 100,000.00
Electrical engineering sub contractor rate 1.00 90,000.00 No VAT 90,000.00
Basic distribution board installation ,3 phase,
1
1.00 12,000.00 15% 12,000.00
3 phase ligthning protection
Manufacture engineering dimensioning low,
high vol
1.00 100,000.00 15% 100,000.00
Fit ripple relay geyser,fit sub board to out 1.00 1,000.00 15% 1,000.00
Supply and lay 3 phase cable.from boundary
.metre
1.00 1,000.00 15% 1,000.00
Business engineering 1.00 20,000.00 No VAT 20,000.00
Marketing engineering 1.00 400.00 15% 400.00
Subtotal (includes a discount of
60,000,000.00)
340,324,400.00
TOTAL VAT 32,160.00
TOTAL ZAR 340,356,560.00
Due Date: 29 Jul 2023

nvoice INV-0004 from Tshingombe for mmsale@shoprite.co.za

InboxInvoice INV-0022 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Fri, Aug 11, 4:57 PM (2 days ago)

to
me

Tshingombe

Hi,

Here's invoice INV-0022 for ZAR 8,462,131,154.45.

The amount outstanding of ZAR 8,462,131,154.45 is due on 07 Aug 2023.

View your bill online:
https://in.xero.com/LZOEeMseykPGZTwNtYPOb6jHA1fCR4RHo0iVsiRk

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

One attachment • Scanned by Gmail
Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
DRAFT INVOICE
mmsale@shoprite.co.za
Invoice Date
2 Aug 2023
Invoice Number
INV-0022
Reference
2345
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Engineering electrical , assessment moderator 1.00 23,990,000.00 23,990,000.00
Engineering chemistry, engineering physics, metall 1.00 2,000,000.00 15% 2,000,000.00
Engineering plastic ,metallurgie, geotechnical 1.00 2,345.00 15% 2,345.00
Engineering trade council quality low criterion 1.00 20,000.00 No VAT 20,000.00
Manufacture material conductor, cable,wire 1.00 50,000.00 15% 50,000.00
Engineering, construction civil,mecanic,const elec 1.00 345,654.00 15% 345,654.00
Implementation engineering electrical circular tra 1.00 2,223.00 No VAT 2,223.00
Engineering elect, electrotech ,load EIC,norm symb 1.00 200,898.00 15% 200,898.00
Manufacture,control logic , engineering fund,syst 1.00 3,450,008,767.00 15% 3,450,008,767.00
Engineering, artisan,clot ,logistic, operational m 1.00 209,989.00 15% 209,989.00
Manufacture,control logic , engineering fund,syst 1.00 3,450,008,767.00 15% 3,450,008,767.00
Engineering,Elec , electromagnetic,AC,DC load 1.00 209,099,878.00 15% 209,099,878.00
Manufacture,cell battery,Solaire panel, 1.00 200,045.00 15% 200,045.00
Fit, appliance electrical house home , industrial
Manufacture, mathematics engineering funct 1.00 2,578,987.00 No VAT 2,578,987.00
Manufacture, motoring vehicle,electrogene , energy 1.00 209,000,000.00 15% 209,000,000.00
Research metropolitan police engineering, tpm ,con 1.00 400,000.00 No VAT 400,000.00
Manufacture, washing machine ,fridge, air cooling 1.00 50,000.00 15% 50,000.00
Police engineering,forensic technology,detective,i 1.00 400,000.00 No VAT 400,000.00
Supply and lay 3 phase cable.from boundary .metre 1.00 1,000.00 15% 1,000.00
Research engineer roles,skill,salary , responsible 1.00 5,000,000.00 No VAT 5,000,000.00

Research engineer roles,skill,salary , responsible 1.00 5,000,000.00 No VAT 5,000,000.00
Business engineering 1.00 20,000.00 No VAT 20,000.00
Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
Description Quantity Unit Price VAT Amount ZAR
Fit ripple relay geyser,fit sub board to out 1.00 1,000.00 15% 1,000.00
Research on low voltage distribution network opera 1.00 5,000,000.00 No VAT 5,000,000.00
3 phase ligthning protection
Electrical engineering sub contractor rate 1.00 90,000.00 No VAT 90,000.00
Engineering, construct electric , electromechanic 1.00 239,000.00 15% 239,000.00
Subtotal 7,363,918,553.00
TOTAL VAT 1,098,212,601.45
TOTAL ZAR 8,462,131,154.45
Due Date: 7 Aug 2023

Invoice INV-0032 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Fri, Aug 11, 4:57 PM (2 days ago)

to
me

Tshingombe

Hi,

Here's invoice INV-0032 for ZAR 27,323,434.20.

The amount outstanding of ZAR 27,323,434.20 is due on.

View your bill online:
https://in.xero.com/DDMGQPzH5UX6FqubQvDIgUeV9HNPNLdiJySqcTxk

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
DRAFT INVOICE
mmsale@shoprite.co.za
Invoice Date
6 Aug 2023
Invoice Number
INV-0032

Reference
2500
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Instruct info manage system , commissair, rulings 1.00 2,500.00 15% 2,500.00
Instruct,information processing commissair marks 1.00 25,000.00 15% 25,000.00
Instruct,adm skill communication, commissair mark 1.00 2,699,389.00 15% 2,699,389.00
Instruct, office travelling , commissair rulings c 1.00 52,000.00 15% 52,000.00
Instruct, performance,info database code , 1.00 56,800.00 15% 56,800.00
Instruct, info data base logic control 1.00 25,899.00 15% 25,899.00
Instruct,info data base info , creation file , doc 1.00 258,000.00 15% 258,000.00
Instruct , database operating system , computer 1.00 258,009.00 15% 258,009.00
Instruct, database treatment text table creat , 1.00 2,580,996.00 15% 2,580,996.00
Instruct, database creation ,access key lock commi 1.00 256,690.00 15% 256,690.00
Instruct, code database visuel basic, commissair 1.00 258,639.00 15% 258,639.00
Instruct, database drawing cad , commissair 1.00 2,589,658.00 15% 2,589,658.00
Instruct,code database image 1.00 536,989.00 15% 536,989.00
Instruct, database Unix web mail office 1.00 2,589,636.00 15% 2,589,636.00
Instruct , database intelligence robot, system 1.00 582,669.00 15% 582,669.00
Instruct,databee language machine ,it manufac 1.00 536,999.00 15% 536,999.00
Instruct, data cc+, computer sale cash ,note 1.00 258,996.00 15% 258,996.00
Instruct, cybersecurity,policy safety database 1.00 2,589,963.00 15% 2,589,963.00
Instruct, database, creat hard word sofward, 1.00 25,996.00 15% 25,996.00
Instruc,data initial unity central ,logic arithmet 1.00 2,500,693.00 15% 2,500,693.00
Instruct, database screen VGA ,pixel svga, code 1.00 2,580,996.00 15% 2,580,996.00
Instruct, database display mouse , module monitor 1.00 36,500.00 15% 36,500.00
,instruct ,printer ,scanner wizard database, 1.00 258,906.00 15% 258,906.00
Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
Description Quantity Unit Price VAT Amount ZAR
Instruct, database cable port USB,fibre optic,pin 1.00 258,909.00 15% 258,909.00
Instruct,database mathematics informatique, 1.00 52,006.00 15% 52,006.00
Instruct, technology info ,actual view open .ms 1.00 250,069.00 15% 250,069.00
Instruct, trainer PC info path office professional 1.00 693,369.00 15% 693,369.00
Instruct database ,trainer circulum, 1.00 25,800.00 15% 25,800.00
Instruc,logic ,data electric,pin ,address PUK,regi 1.00 269,936.00 15% 269,936.00
Instruct,register,pin,flip flop,address CPU, lectu 1.00 569,000.00 15% 569,000.00
Instruct,data ,control logic ,key automate,PLC 1.00 52,696.00 15% 52,696.00
Instruct ,data Fortain,,Pascal, prologiciel 1.00 25,800.00 15% 25,800.00
Subtotal 23,759,508.00
TOTAL VAT 3,563,926.20
TOTAL ZAR 27,323,434.20
Due Date:

Invoice INV-0015 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com> Fri, Aug 11, 4:57 PM (2 days ago)

to
me

Tshingombe

Hi,

Here's invoice INV-0015 for ZAR 6,826,877,014.80.

The amount outstanding of ZAR 6,826,877,014.80 is due on.

View your bill online:
https://in.xero.com/CJMVBgqmqMiCCsOHqGKpl59HvQzC2ngS1Jc463NP

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
DRAFT INVOICE
mmsale@shoprite.co.za
Invoice Date
31 Jul 2023
Invoice Number
INV-0015
Reference
2000
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA

Description	Quantity	Unit Price	VAT	Amount ZAR
Manufacture material conductor, cable,wire	1.00	50,000.00	15%	50,000.00
Hendrik Potgieter St	1.00	30,000.00	15%	30,000.00
Manufacture material semie conductor,electronics	1.00	500,000.00	15%	500,000.00
Manufacture, AC,DC machine motor,alternator,	1.00	200,000.00	15%	200,000.00
Manufacture,cell battery,Solaire panel,	1.00	200,045.00	15%	200,045.00
Manufacture, instrument measure,control electric	1.00	2,098,987.00	No VAT	2,098,987.00
Manufacture, wire premise,way switch ,panel wire	1.00	200,090.00	15%	200,090.00
Manufacture, light bulb,switch outlet socket,	1.00	200,989,878.00	15%	200,989,878.00
Manufacture,stove,guyser,iron,kettle,	1.00	34,567,666.00	15%	34,567,666.00
Manufacture, drawing electric ,diagram ,panelcontr	1.00	3,400,000.00	15%	3,400,000.00
Manufacture, washing machine ,fridge, air cooling	1.00	50,000.00	15%	50,000.00
Manufacture,electrotech , electrotechnolgy, relate	1.00	209,000.00	15%	209,000.00
Manufacture,didactic educare material electric pan	1.00	3,000,000.00	15%	3,000,000.00
Manufacture, mechanitech,mechanitechnology	1.00	2,000,980,000.00	15%	2,000,980,000.00
Manufacture, engineering science,power machine	1.00	200,547.00	15%	200,547.00
Manufacture, component relay ,contactor,breaker,	1.00	28,760,999.00	15%	28,760,999.00
Manufacture,control logic , engineering fund,syst	1.00	3,450,008,767.00	15%	3,450,008,767.00
Manufacture, mathematics engineering funct	1.00	2,578,987.00	No VAT	2,578,987.00
Manufacture, motoring vehicle,electrogene , energy	1.00	209,000,000.00	15%	209,000,000.00

Subtotal 5,937,024,966.00
TOTAL VAT 889,852,048.80
TOTAL ZAR 6,826,877,014.80
Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
Due Date:

fiston tshingombe <messaging-service@post.xero.com>

Fri, Aug 11, 4:58 PM (2 days ago)

to
me

Tshingombe

Hi,

Here's invoice INV-0004 for ZAR 100,920.00.

The amount outstanding of ZAR 100,920.00 is due on 27 Jul 2023.

View your bill online:
https://in.xero.com/96eiAbqaB6JLBSexbxzDRSiowIn8K6XrDS6zd1MA

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
DRAFT INVOICE
mmsale@shoprite.co.za
Invoice Date
27 Jul 2023
Invoice Number
INV-0004
Reference
5200
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Business engineering 1.00 20,000.00 No VAT 20,000.00
Business engineering 1.00 20,000.00 No VAT 20,000.00
Business engineering 1.00 20,000.00 No VAT 20,000.00
Business engineering 1.00 20,000.00 No VAT 20,000.00
Business engineering 1.00 20,000.00 No VAT 20,000.00

Marketing engineering 1.00 400.00 15% 400.00
Marketing engineering 1.00 400.00 15% 400.00
Subtotal 100,800.00
TOTAL VAT 120.00
TOTAL ZAR 100,920.00
Due Date: 27 Jul 2023

Invoice INV-0012 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com> Wed, Aug 9, 3:49 PM (4 days ago)

to
me

Tshingombe

View invoice R6,054,596.00 due 4 Aug
INV-0012

Hi,

Here's invoice INV-0012 for ZAR 6,054,596.00.

The amount outstanding of ZAR 6,054,596.00 is due on 04 Aug 2023.

View your bill online:
https://in.xero.com/5BFzgsDJ88F5YgTMwA4FO5rf0ld6mTlft4DTxlYR

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
TAX INVOICE
mmsale@shoprite.co.za
Invoice Date
30 Jul 2023
Invoice Number
INV-0012
Reference
5000
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Implementation engineering electrical circular tra 1.00 2,223.00 No VAT 2,223.00

Engineering trade council quality low criterion 1.00 20,000.00 No VAT 20,000.00
Diplomat engineering national implementation 1.00 40,000.00 No VAT 40,000.00
Implementation engineering electrical circular tra 1.00 2,223.00 No VAT 2,223.00
Engineering trade council quality low criterion 1.00 20,000.00 No VAT 20,000.00
Research plan engineering type computer,time frame 1.00 2,000.00 No VAT 2,000.00
Research plan engineering type computer,time frame 1.00 2,000.00 No VAT 2,000.00
Research implementation framework qualifications 1.00 50,000.00 No VAT 50,000.00
Research metropolitan police engineering, tpm ,con 1.00 400,000.00 No VAT 400,000.00
Research engineer roles,skill,salary , responsible 1.00 5,000,000.00 No VAT 5,000,000.00
Police engineering,forensic technology,detective,i 1.00 400,000.00 No VAT 400,000.00
Fit, appliance electrical house home , industrial
Manufacture engineering dimensioning low, high vol 1.00 100,000.00 15% 100,000.00
Supply and lay 3 phase cable.from boundary .metre 1.00 1,000.00 15% 1,000.00
Subtotal 6,039,446.00
TOTAL VAT 15,150.00
TOTAL ZAR 6,054,596.00
Due Date: 4 Aug 2023

Invoice INV-0031 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Wed, Aug 9, 3:49 PM (4 days ago)

to
me

Tshingombe

View invoice R26,268,387.40 due 6 Aug
INV-0031

Hi,

Here's invoice INV-0031 for ZAR 26,268,387.40.

The amount outstanding of ZAR 26,268,387.40 is due on 06 Aug 2023.

View your bill online:
https://in.xero.com/kKCxSNLCh6R9CHqxlGLIkNDh1VfzCjPxs3ohacyQ

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Invoice INV-0014 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com> Wed, Aug 9, 3:49 PM (4 days ago)

to
me

Tshingombe

View invoice R6,826,877,014.80 due 4 Aug
INV-0014

Hi,

Here's invoice INV-0014 for ZAR 6,826,877,014.80.

The amount outstanding of ZAR 6,826,877,014.80 is due on 04 Aug 2023.

View your bill online:
https://in.xero.com/xqyuY0lDdsEAgjdXxDbErCVFldIPx34tXnHmFggD

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

One attachment • Scanned by Gmail
Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
TAX INVOICE
mmsale@shoprite.co.za
Invoice Date
31 Jul 2023
Invoice Number
INV-0014
Reference
2000
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA

Description	Quantity	Unit Price	VAT	Amount ZAR
Manufacture material conductor, cable,wire	1.00	50,000.00	15%	50,000.00
Hendrik Potgieter St	1.00	30,000.00	15%	30,000.00
Manufacture material semie conductor,electronics	1.00	500,000.00	15%	500,000.00
Manufacture, AC,DC machine motor,alternator,	1.00	200,000.00	15%	200,000.00
Manufacture,cell battery,Solaire panel,	1.00	200,045.00	15%	200,045.00
Manufacture, instrument measure,control electric	1.00	2,098,987.00	No VAT	2,098,987.00
Manufacture, wire premise,way switch ,panel wire	1.00	200,090.00	15%	200,090.00
Manufacture, light bulb,switch outlet socket,	1.00	200,989,878.00	15%	200,989,878.00
Manufacture,stove,guyser,iron,kettle,	1.00	34,567,666.00	15%	34,567,666.00
Manufacture, drawing electric ,diagram ,panelcontr	1.00	3,400,000.00	15%	3,400,000.00
Manufacture, washing machine ,fridge, air cooling	1.00	50,000.00	15%	50,000.00
Manufacture,electrotech , electrotechnolgy, relate	1.00	209,000.00	15%	209,000.00
Manufacture,didactic educare material electric pan	1.00	3,000,000.00	15%	3,000,000.00
Manufacture, mechanitech,mechanitechnology	1.00	2,000,980,000.00	15%	2,000,980,000.00
Manufacture, engineering science,power machine	1.00	200,547.00	15%	200,547.00
Manufacture, component relay ,contactor,breaker,	1.00	28,760,999.00	15%	28,760,999.00

Manufacture,control logic , engineering fund,syst 1.00 3,450,008,767.00 15% 3,450,008,767.00
Manufacture, mathematics engineering funct 1.00 2,578,987.00 No VAT 2,578,987.00
Manufacture, motoring vehicle,electrogene , energy 1.00 209,000,000.00 15% 209,000,000.00
Subtotal 5,937,024,966.00
TOTAL VAT 889,852,048.80
TOTAL ZAR 6,826,877,014.80
Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
Due Date: 4 Aug 2023

Invoice INV-0017 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com> Wed, Aug 9, 3:49 PM (4 days ago)

to
me

Tshingombe

View invoice R495,785,952.30 due 4 Aug
INV-0017

Hi,

Here's invoice INV-0017 for ZAR 495,785,952.30.

The amount outstanding of ZAR 495,785,952.30 is due on 04 Aug 2023.

View your bill online:
https://in.xero.com/1JmDmQv7eN52UD2Nbi3rFhUW3f9gSF5cbAUYBuJl

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
TAX INVOICE
mmsale@shoprite.co.za
Invoice Date
1 Aug 2023
Invoice Number
INV-0017

Reference
400
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Engineering chemistry, engineering physics, metall 1.00 2,000,000.00 15% 2,000,000.00
Engineering plastic ,metallurgie, geotechnical 1.00 2,345.00 15% 2,345.00
Engineering, construction civil,mecanic,const elec 1.00 345,654.00 15% 345,654.00
Engineering build ,mecanic, electric support 1.00 203,040.00 15% 203,040.00
Engineering,quality survey ,geomatic 1.00 209,898,765.00 15% 209,898,765.00
Engineering, construct electric , electromechanic 1.00 239,000.00 15% 239,000.00
Engineering,construct elect,substation,station ele 1.00 2,000,989.00 15% 2,000,989.00
Engineering,Elec ,electro static load ,dynamic ,ki 1.00 2,345,999.00 15% 2,345,999.00
Engineering,Elec , electromagnetic,AC,DC load 1.00 209,099,878.00 15% 209,099,878.00
Engineering,Elec trade,load manufacture supply, 1.00 200,989.00 15% 200,989.00
Engineering elect, electrotech ,load EIC,norm symb 1.00 200,898.00 15% 200,898.00
Engineering, Electrotechnolgy,power rate nomin 1.00 2,098,998.00 15% 2,098,998.00
Engineering elect,energy norm , industrial energy 1.00 2,099,989.00 No VAT 2,099,989.00
Engineering,gov social municipality metering energ 1.00 235,689.00 15% 235,689.00
Engineering, artisan,clot ,logistic, operational m 1.00 209,989.00 15% 209,989.00
Engineering,mining , maintence, repare, manufactur 1.00 209,909.00 15% 209,909.00
Subtotal 431,392,131.00
TOTAL VAT 64,393,821.30
TOTAL ZAR 495,785,952.30
Due Date: 4 Aug 2023

Invoice INV-0038 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Tue, Aug 8, 4:02 PM (5 days ago)

to
me

Tshingombe

View invoice R70,638,333.70 due 8 Aug
INV-0038

Hi,

Here's invoice INV-0038 for ZAR 70,638,333.70.

The amount outstanding of ZAR 70,638,333.70 is due on 08 Aug 2023.

View your bill online: https://in.xero.com/YnI3DSxeJSdMrikn5GVUIsI8xryxbOhlyOnKQn9b

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
TAX INVOICE
mmsale@shoprite.co.za
Invoice Date
8 Aug 2023
Invoice Number
INV-0038
Reference
25663
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Engineering electrical bargaining, skills development
training safety security
1.00 5,000,000.00 15% 5,000,000.00
Instruct, close bid award certificate, con media l 1.00 56,399,638.00 15% 56,399,638.00
Educ , certificate building,hand book,license buil 1.00 25,000.00 15% 25,000.00
Subtotal 61,424,638.00
TOTAL VAT 9,213,695.70
TOTAL ZAR 70,638,333.70
Due Date: 8 Aug 2023

nvoice INV-0013 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com> Sun, Jul 30, 9:04 PM

to me,
mmsale

Tshingombe

View invoice R2,223.00 due 3 Aug
INV-0013

Hi,

Here's invoice INV-0013 for ZAR 2,223.00.

The amount outstanding of ZAR 2,223.00 is due on 03 Aug 2023.

View your bill online:
https://in.xero.com/RUQJqu34U6bqlm6JtwLvSHYcDHgt8Yu4ird8fMsj

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

One attachment • Scanned by Gmail
Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
TAX INVOICE
mmsale@shoprite.co.za
Invoice Date
30 Jul 2023
Invoice Number
INV-0013
Reference
3500
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Implementation engineering electrical circular tra 1.00 2,223.00 No VAT 2,223.00
Subtotal 2,223.00
TOTAL VAT 0.00
TOTAL ZAR 2,223.00
Due Date: 3 Aug 2023

Invoice INV-0029 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Thu, Aug 10, 3:53 PM (3 days ago)

to
me

Tshingombe

View invoice

R8,119,133.40 due 10 Aug
INV-0029

Hi,

Here's invoice INV-0029 for ZAR 8,119,133.40.

The amount outstanding of ZAR 8,119,133.40 is due on 10 Aug 2023.

View your bill online:
https://in.xero.com/LJkMJgvKi8OaQG6UpzYqNNB5ZfWF0D1geqhUlwjM

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
TAX INVOICE
mmsale@shoprite.co.za
Invoice Date
5 Aug 2023
Invoice Number
INV-0029
Reference
58900
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA

Description	Quantity	Unit Price	VAT	Amount ZAR
Instruct commission, council,visa passport id	1.00	25,000.00	15%	25,000.00
Instruct, commission,Eng visa passport,I'd supplie	1.00	200,690.00	15%	200,690.00
Instruc commis, municipality,visa engine supply	1.00	2,506,690.00	15%	2,506,690.00
Instruct, commission composit,visa I'd , supply	1.00	2,536,609.00	15%	2,536,609.00
Instruct,com, I'd visa ,wegh,scale,size, plate sup	1.00	52,669.00	15%	52,669.00
Instruct com, visa wehit plate number, fiscality	1.00	258,800.00	15%	258,800.00
Instruct,visa ,markdept , license fiscal,license	1.00	258,369.00	15%	258,369.00
Instruct ,visa electrical ,meter energy, permit	1.00	25,000.00	15%	25,000.00

Instruc, bulletin,visa certificate,metering city 1.00 2,500.00 15% 2,500.00
Instruct,com,visa city meter ,plate , fiscality 1.00 528,809.00 15% 528,809.00
Instruct com,plate fiscal,plate , empower,value 1.00 639,980.00 15% 639,980.00
Fiscal fraude,Min,max value , energie tax , engine 1.00 25,000.00 15% 25,000.00
Subtotal 7,060,116.00
TOTAL VAT 1,059,017.40
TOTAL ZAR 8,119,133.40
Due Date: 10 Aug 2023

Invoice INV-0031 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Thu, Aug 10, 3:53 PM (3 days ago)

to
me

Tshingombe

View invoice R26,268,387.40 due 6 Aug
INV-0031

Hi,

Here's invoice INV-0031 for ZAR 26,268,387.40.

The amount outstanding of ZAR 26,268,387.40 is due on 06 Aug 2023.

View your bill online:
https://in.xero.com/kKCxSNLCh6R9CHqxlGLIkNDh1VfzCjPxs3ohacyQ

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
TAX INVOICE
mmsale@shoprite.co.za
Invoice Date
6 Aug 2023
Invoice Number
INV-0031
Reference
2500
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA

Description	Quantity	Unit Price	VAT	Amount ZAR
Instruct info manage system , commissair, rulings	1.00	2,500.00	15%	2,500.00
Instruct,information processing commissair marks	1.00	25,000.00	15%	25,000.00
Instruct,adm skill communication, commissair mark	1.00	2,699,389.00	15%	2,699,389.00
Instruct, office travelling , commissair rulings c	1.00	52,000.00	15%	52,000.00
Instruct, performance,info database code ,	1.00	56,800.00	15%	56,800.00
Instruct, info data base logic control	1.00	25,899.00	15%	25,899.00
Instruct,info data base info , creation file , doc	1.00	258,000.00	15%	258,000.00

Instruct , database operating system , computer 1.00 258,009.00 15% 258,009.00
Instruct, database treatment text table creat , 1.00 2,580,996.00 15% 2,580,996.00
Instruct, database creation ,access key lock commi 1.00 256,690.00 15% 256,690.00
Instruct, code database visuel basic, commissair 1.00 258,639.00 15% 258,639.00
Instruct, database drawing cad , commissair 1.00 2,589,658.00 15% 2,589,658.00
Instruct,code database image 1.00 536,989.00 15% 536,989.00
Instruct, database Unix web mail office 1.00 2,589,636.00 15% 2,589,636.00
Instruct , database intelligence robot, system 1.00 582,669.00 15% 582,669.00
Instruct,databee language machine ,it manufac 1.00 536,999.00 15% 536,999.00
Instruct, data cc+, computer sale cash ,note 1.00 258,996.00 15% 258,996.00
Instruct, cybersecurity,policy safety database 1.00 2,589,963.00 15% 2,589,963.00
Instruct, database, creat hard word sofward, 1.00 25,996.00 15% 25,996.00
Instruc,data initial unity central ,logic arithmet 1.00 2,500,693.00 15% 2,500,693.00
Instruct, database screen VGA ,pixel svga, code 1.00 2,580,996.00 15% 2,580,996.00
Instruct, database display mouse , module monitor 1.00 36,500.00 15% 36,500.00
,instruct ,printer ,scanner wizard database, 1.00 258,906.00 15% 258,906.00
Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
Description Quantity Unit Price VAT Amount ZAR
Instruct, database cable port USB,fibre optic,pin 1.00 258,909.00 15% 258,909.00
Instruct,database mathematics informatique, 1.00 52,006.00 15% 52,006.00
Instruct, technology info ,actual view open .ms 1.00 250,069.00 15% 250,069.00
Instruct, trainer PC info path office professional 1.00 693,369.00 15% 693,369.00
Instruct database ,trainer circulum, 1.00 25,800.00 15% 25,800.00
Subtotal 22,842,076.00
TOTAL VAT 3,426,311.40
TOTAL ZAR 26,268,387.40
Due Date: 6 Aug 2023

Invoice INV-0017 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Thu, Aug 10, 3:53 PM (3 days ago)

to
me

Tshingombe

View invoice R495,785,952.30 due 4 Aug
INV-0017

Hi,

Here's invoice INV-0017 for ZAR 495,785,952.30.

The amount outstanding of ZAR 495,785,952.30 is due on 04 Aug 2023.

View your bill online:
https://in.xero.com/1JmDmQv7eN52UD2Nbi3rFhUW3f9gSF5cbAUYBuJl

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

One attachment • Scanned by Gmail
Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
TAX INVOICE
mmsale@shoprite.co.za
Invoice Date
1 Aug 2023
Invoice Number
INV-0017
Reference
400
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA

Description	Quantity	Unit Price	VAT	Amount ZAR
Engineering chemistry, engineering physics, metall	1.00	2,000,000.00	15%	2,000,000.00
Engineering plastic ,metallurgie, geotechnical	1.00	2,345.00	15%	2,345.00
Engineering, construction civil,mecanic,const elec	1.00	345,654.00	15%	345,654.00
Engineering build ,mecanic, electric support	1.00	203,040.00	15%	203,040.00
Engineering,quality survey ,geomatic	1.00	209,898,765.00	15%	209,898,765.00
Engineering, construct electric , electromechanic	1.00	239,000.00	15%	239,000.00
Engineering,construct elect,substation,station ele	1.00	2,000,989.00	15%	2,000,989.00
Engineering,Elec ,electro static load ,dynamic ,ki	1.00	2,345,999.00	15%	2,345,999.00
Engineering,Elec , electromagnetic,AC,DC load	1.00	209,099,878.00	15%	209,099,878.00
Engineering,Elec trade,load manufacture supply,	1.00	200,989.00	15%	200,989.00
Engineering elect, electrotech ,load EIC,norm symb	1.00	200,898.00	15%	200,898.00
Engineering, Electrotechnolgy,power rate nomin	1.00	2,098,998.00	15%	2,098,998.00

Engineering elect,energy norm , industrial energy 1.00 2,099,989.00 No VAT 2,099,989.00
Engineering,gov social municipality metering energ 1.00 235,689.00 15% 235,689.00
Engineering, artisan,clot ,logistic, operational m 1.00 209,989.00 15% 209,989.00
Engineering,mining , maintence, repare, manufactur 1.00 209,909.00 15% 209,909.00
Subtotal 431,392,131.00
TOTAL VAT 64,393,821.30
TOTAL ZAR 495,785,952.30
Due Date: 4 Aug 2023

Invoice INV-0014 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Thu, Aug 10, 3:53 PM (3 days ago)

to
me

Tshingombe

View invoice

R6,826,877,014.80 due 4 Aug
INV-0014

Hi,

Here's invoice INV-0014 for ZAR 6,826,877,014.80.

The amount outstanding of ZAR 6,826,877,014.80 is due on 04 Aug 2023.

View your bill online:
https://in.xero.com/xqyuY0lDdsEAgjdXxDbErCVFldIPx34tXnHmFggD

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
TAX INVOICE
mmsale@shoprite.co.za
Invoice Date
31 Jul 2023
Invoice Number
INV-0014
Reference
2000
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Manufacture material conductor, cable,wire 1.00 50,000.00 15% 50,000.00
Hendrik Potgieter St 1.00 30,000.00 15% 30,000.00
Manufacture material semie conductor,electronics 1.00 500,000.00 15% 500,000.00
Manufacture, AC,DC machine motor,alternator, 1.00 200,000.00 15% 200,000.00
Manufacture,cell battery,Solaire panel, 1.00 200,045.00 15% 200,045.00
Manufacture, instrument measure,control electric 1.00 2,098,987.00 No VAT 2,098,987.00
Manufacture, wire premise,way switch ,panel wire 1.00 200,090.00 15% 200,090.00
Manufacture, light bulb,switch outlet socket, 1.00 200,989,878.00 15% 200,989,878.00
Manufacture,stove,guyser,iron,kettle, 1.00 34,567,666.00 15% 34,567,666.00
Manufacture, drawing electric ,diagram ,panelcontr 1.00 3,400,000.00 15% 3,400,000.00
Manufacture, washing machine ,fridge, air cooling 1.00 50,000.00 15% 50,000.00

Manufacture,electrotech , electrotechnolgy, relate 1.00 209,000.00 15% 209,000.00
Manufacture,didactic educare material electric pan 1.00 3,000,000.00 15% 3,000,000.00
Manufacture, mechanitech,mechanitechnology 1.00 2,000,980,000.00 15% 2,000,980,000.00
Manufacture, engineering science,power machine 1.00 200,547.00 15% 200,547.00
Manufacture, component relay ,contactor,breaker, 1.00 28,760,999.00 15% 28,760,999.00
Manufacture,control logic , engineering fund,syst 1.00 3,450,008,767.00 15% 3,450,008,767.00
Manufacture, mathematics engineering funct 1.00 2,578,987.00 No VAT 2,578,987.00
Manufacture, motoring vehicle,electrogene , energy 1.00 209,000,000.00 15% 209,000,000.00
Subtotal 5,937,024,966.00
TOTAL VAT 889,852,048.80
TOTAL ZAR 6,826,877,014.80
Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
Due Date: 4 Aug 2023

Invoice INV-0012 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Thu, Aug 10, 3:53 PM (3 days ago)

to
me

Tshingombe

View invoice

R6,054,596.00 due 4 Aug
INV-0012

Hi,

Here's invoice INV-0012 for ZAR 6,054,596.00.

The amount outstanding of ZAR 6,054,596.00 is due on 04 Aug 2023.

View your bill online:
https://in.xero.com/5BFzgsDJ88F5YgTMwA4FO5rf0ld6mTlft4DTxlYR

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
TAX INVOICE

mmsale@shoprite.co.za
Invoice Date
30 Jul 2023
Invoice Number
INV-0012
Reference
5000
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Implementation engineering electrical circular tra 1.00 2,223.00 No VAT 2,223.00
Engineering trade council quality low criterion 1.00 20,000.00 No VAT 20,000.00
Diplomat engineering national implementation 1.00 40,000.00 No VAT 40,000.00
Implementation engineering electrical circular tra 1.00 2,223.00 No VAT 2,223.00
Engineering trade council quality low criterion 1.00 20,000.00 No VAT 20,000.00
Research plan engineering type computer,time frame 1.00 2,000.00 No VAT 2,000.00
Research plan engineering type computer,time frame 1.00 2,000.00 No VAT 2,000.00
Research implementation framework qualifications 1.00 50,000.00 No VAT 50,000.00
Research metropolitan police engineering, tpm ,con 1.00 400,000.00 No VAT 400,000.00
Research engineer roles,skill,salary , responsible 1.00 5,000,000.00 No VAT 5,000,000.00
Police engineering,forensic technology,detective,i 1.00 400,000.00 No VAT 400,000.00
Fit, appliance electrical house home , industrial
Manufacture engineering dimensioning low, high vol 1.00 100,000.00 15% 100,000.00
Supply and lay 3 phase cable.from boundary .metre 1.00 1,000.00 15% 1,000.00
Subtotal 6,039,446.00
TOTAL VAT 15,150.00
TOTAL ZAR 6,054,596.00
Due Date: 4 Aug 2023

Invoice INV-0033 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com> Thu, Aug 10, 3:53 PM (3 days ago)

to
me

Tshingombe

View invoice R115,103.50 due 12 Aug
INV-0033

Hi,

Here's invoice INV-0033 for ZAR 115,103.50.

The amount outstanding of ZAR 115,103.50 is due on 12 Aug 2023.

View your bill online:
https://in.xero.com/2DJ3qSg6u1X7h1gvAK9zd5IBzsca9VdbEgReYGul

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
TAX INVOICE
mmsale@shoprite.co.za
Invoice Date
6 Aug 2023
Invoice Number
INV-0033
Reference
25880
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA

Description	Quantity	Unit Price	VAT	Amount ZAR
Training technology information	1.00	100,090.00	15%	100,090.00

Subtotal 100,090.00
TOTAL VAT 15,013.50
TOTAL ZAR 115,103.50
Due Date: 12 Aug 2023

Invoice INV-0036 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Thu, Aug 10, 3:53 PM (3 days ago)

to
me

Tshingombe

View invoice

R2,530,983.25 due 8 Aug
INV-0036

Hi,

Here's invoice INV-0036 for ZAR 2,530,983.25.

The amount outstanding of ZAR 2,530,983.25 is due on 08 Aug 2023.

View your bill online:
https://in.xero.com/bhMKFfljOVdUa1SxSPtuekXT5HfUaxRJ1DIBal6e

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
TAX INVOICE
mmsale@shoprite.co.za

Invoice Date
7 Aug 2023
Invoice Number
INV-0036
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Instruc,court order tax , financial eastate,eng 1.00 50,000.00 15% 50,000.00
Instruct,court order, commission,legal bargaining 1.00 50,006.00 15% 50,006.00
Instruct ,court order award ruling , rescission eg 1.00 500,069.00 15% 500,069.00
Instruct , court order,award certificate,Eng low 1.00 50,006.00 15% 50,006.00
Instruct,court order certificate outc commissair 1.00 500,003.00 15% 500,003.00
Instruct ,court order , granted review labour, 1.00 50,009.00 15% 50,009.00
Instruc,court labour notice motion order ,Eng law 1.00 500,069.00 15% 500,069.00
Instruc,court order data notice motion ,low , eng 1.00 500,693.00 15% 500,693.00
Subtotal 2,200,855.00
TOTAL VAT 330,128.25
TOTAL ZAR 2,530,983.25
Due Date: 8 Aug 2023

Invoice INV-0023 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com> Thu, Aug 10, 3:53 PM (3 days ago)

to
me

Tshingombe

View invoice R1,360,532.80 due 3 Aug
INV-0023

Hi,

Here's invoice INV-0023 for ZAR 1,360,532.80.

The amount outstanding of ZAR 1,360,532.80 is due on 03 Aug 2023.

View your bill online:
https://in.xero.com/zzLZU9c4j7YgpOKQynLioR1KPnY1psU3RDrRXKDU

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Invoice INV-0047 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com> Fri, Aug 11, 5:19 PM (2 days ago)

to me,
mmsale

Tshingombe

View invoice R67,729,158.00 due 11 Aug
INV-0047

Hi,

Here's invoice INV-0047 for ZAR 67,729,158.00.

The amount outstanding of ZAR 67,729,158.00 is due on 11 Aug 2023.

View your bill online:
https://in.xero.com/XEJTRggHZX8IDozNGEFuXi3Y9QibFrdddcpWVzqo

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
TAX INVOICE
mmsale@shoprite.co.za
Invoice Date
11 Aug 2023
Invoice Number
INV-0047
Reference
54799
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Education technology engineering 1.00 500,980.00 15% 500,980.00
Instruct,health clean biotech ,food,vacum tend low 1.00 50,098.00 15% 50,098.00
Instruct,inspect food take typical info,compos low 1.00 50,000.00 15% 50,000.00
Instruct,buotechno machine food cook,agro value 1.00 500,989.00 15% 500,989.00
Instruct, biotechnology, food beverages, composite 1.00 50,000.00 15% 50,000.00
Instruct,typic food nutrie ph ,basic,acid 7, GRA v 1.00 500,989.00 15% 500,989.00
Instruct,food medecinal value assessment low, 1.00 5,009,898.00 15% 5,009,898.00
Instruct,biomicrobiologi,scanner biochem,low 1.00 50,009.00 15% 50,009.00
Instruct ,policy safe biotechnology skill dev,Lo 1.00 500,098.00 15% 500,098.00
Instruct,food value Assessment Portofilio low,osha 1.00 500,098.00 15% 500,098.00
Instruct,order ob ,access book,log book,incid book 1.00 50,000,693.00 15% 50,000,693.00
Instruct, exercise book ,journal account engineeri 1.00 5,000.00 15% 5,000.00
Instruct,book record sale cust ,exercise book note 1.00 500,063.00 15% 500,063.00
Instruct, biotechnology.biogenie, creation 1.00 569,999.00 15% 569,999.00
Instruct, skill devel casebook Portofilio low eng 1.00 56,000.00 15% 56,000.00
Instruct , exercise book.library biblio bookeping 1.00 50,006.00 15% 50,006.00
Subtotal 58,894,920.00
TOTAL VAT 8,834,238.00
TOTAL ZAR 67,729,158.00
Due Date: 11 Aug 2023

Invoice INV-0026 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Thu, Aug 10, 3:53 PM (3 days ago)

to
me

Tshingombe

View invoice

R10,125,676.40 due 5 Aug
INV-0026

Hi,

Here's invoice INV-0026 for ZAR 10,125,676.40.

The amount outstanding of ZAR 10,125,676.40 is due on 05 Aug 2023.

View your bill online:
https://in.xero.com/1tBdpHm1zZb23TSMgaf6yg5nl6xNHjUgNjvcr09Z

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
TAX INVOICE
mmsale@shoprite.co.za
Invoice Date
5 Aug 2023
Invoice Number
INV-0026
Reference
,2569
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA

Description	Quantity	Unit Price	VAT	Amount ZAR
Instruct, commission electric , bargaining low	1.00	25,366.00	15%	25,366.00
Instruct commission electric engineering low,	1.00	62,336.00	15%	62,336.00

Instruct commission electrotech genie ruling 1.00 366,936.00 15% 366,936.00
Instruct commission, energie electric engineering 1.00 6,399,965.00 15% 6,399,965.00
Instruct, commission electromechanic rules 1.00 69,369.00 15% 69,369.00
Instruct commission entrepreneurs Elec rules 1.00 60,098.00 15% 60,098.00
Instruct, commission city municipal energie low 1.00 639,963.00 15% 639,963.00
Instruct commission mechanic,water hydraulic 1.00 63,399.00 15% 63,399.00
Instruct commission,construct civil build low, 1.00 63,999.00 15% 63,999.00
Instruct commission, science engineering,PHY,che 1.00 56,999.00 15% 56,999.00
Instruct commission, machinery labour lift Amanda 1.00 59,969.00 15% 59,969.00
Instruc, drilling,turning ,foundry, paint , molecu 1.00 69,669.00 15% 69,669.00
056693 1.00 529,996.00 15% 529,996.00
Instruct, commission 1.00 266,963.00 15% 266,963.00
Instruct,composit ,ph basic,acid,bpolicy , safety, 1.00 69,909.00 15% 69,909.00
Subtotal 8,804,936.00
TOTAL VAT 1,320,740.40
TOTAL ZAR 10,125,676.40
Due Date: 5 Aug 2023

Invoice INV-0001 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Thu, Aug 10, 3:53 PM (3 days ago)

to
me

Tshingombe

View invoice

R2,300.00 due 26 Jul
INV-0001

Hi,

Here's invoice INV-0001 for ZAR 2,300.00.

The amount outstanding of ZAR 2,300.00 is due on 26 Jul 2023.

View your bill online:
https://in.xero.com/XbQPtGpUAxD56hQwXZ1yGnbgVDx3HHsbuXZfD8TX

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
TAX INVOICE
mmsale@shoprite.co.za
Invoice Date
26 Jul 2023
Invoice Number
INV-0001
Reference
520
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Marketing engineering 1.00 400.00 15% 400.00
Marketing engineering 1.00 400.00 15% 400.00
Marketing engineering 1.00 400.00 15% 400.00
Marketing engineering 1.00 400.00 15% 400.00
Marketing engineering 1.00 400.00 15% 400.00
Subtotal 2,000.00
TOTAL VAT 300.00
TOTAL ZAR 2,300.00
Due Date: 26 Jul 2023

Invoice INV-0005 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Thu, Aug 10, 3:53 PM (3 days ago)

to
me

Tshingombe

View invoice

R20,000.00 due 27 Jul
INV-0005

Hi,

Here's invoice INV-0005 for ZAR 20,000.00.

The amount outstanding of ZAR 20,000.00 is due on 27 Jul 2023.

View your bill online:
https://in.xero.com/Dzul8TWlsjQNub5TzOjTa4ULwEJ7aVuCbB5FcspD

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
TAX INVOICE
mmsale@shoprite.co.za
Invoice Date
27 Jul 2023
Invoice Number
INV-0005
Reference
QU-0001
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Business engineering 1.00 20,000.00 No VAT 20,000.00
Subtotal 20,000.00
TOTAL VAT 0.00
TOTAL ZAR 20,000.00
Due Date: 27 Jul 2023

Invoice INV-0007 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Thu, Aug 10, 3:52 PM (3 days ago)

to
me

Tshingombe

Hi,

Here's invoice INV-0007 for ZAR 230,909.00.

The amount outstanding of ZAR 230,909.00 is due on 02 Jul 2023.

View your bill online:
https://in.xero.com/z9x5wh7yB5ICogVcanEasvJEdDm7bGyz3IG6VwRf

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
DRAFT INVOICE
mmsale@shoprite.co.za
Invoice Date
29 Jul 2023
Invoice Number
INV-0007
Reference
520
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Engineering electrical database 1.00 6,589.00 No VAT 6,589.00
Electrical engineering sub contractor rate 1.00 90,000.00 No VAT 90,000.00
Basic distribution board installation ,3 phase, 1 1.00 12,000.00 15% 12,000.00
3 phase ligthning protection
Fit ripple relay geyser,fit sub board to out 1.00 1,000.00 15% 1,000.00
Fit ripple relay geyser,fit sub board to out 1.00 1,000.00 15% 1,000.00
Supply and lay 3 phase cable.from boundary .metre 1.00 1,000.00 15% 1,000.00
Fit ripple relay geyser,fit sub board to out 1.00 1,000.00 15% 1,000.00

Marketing engineering 1.00 400.00 15% 400.00
Fit, appliance electrical house home , industrial
Manufacture engineering dimensioning low, high vol 1.00 100,000.00 15% 100,000.00
Marketing engineering 1.00 400.00 15% 400.00
Subtotal 213,389.00
TOTAL VAT 17,520.00
TOTAL ZAR 230,909.00
Due Date: 2 Jul 2023

Invoice INV-0002 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com> Wed, Jul 26, 3:57 PM

to me, mmsale, estiation, tenderadvicentre, wmcqueries, info, info, itcservicedesk

Tshingombe

Hi,

Here's invoice INV-0002 for ZAR 10,000,000.00.

The amount outstanding of ZAR 10,000,000.00 is due on.

View your bill online: https://in.xero.com/JiqugHefVW6rVPDr53DF7qwjckrhls6bvoleWJXV

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

One attachment • Scanned by Gmail
DRAFT INVOICE
mmsale@shoprite.co.za
Invoice Date
26 Jul 2023
Invoice Number
INV-0002
Tshingombe
Description Quantity Unit Price VAT Amount ZAR
fiston tshingombe 1.00 10,000,000.00 10,000,000.00
Subtotal 10,000,000.00
TOTAL VAT 0.00

TOTAL ZAR 10,000,000.00
Due Date:

Invoice INV-0031 from Demo Company (Global) for Tshingombe

Inbox

fiston tshingombe <messaging-service@post.xero.com>
Sat, Jul 22, 7:10 PM

to
me

View invoice $2,535.55 due 22 Jul
INV-0031

Hi Tshingombe,

Here's invoice INV-0031 for $USD 2,535.55.

The amount outstanding of $USD 2,535.55 is due on 22 Jul 2023.

View and pay your bill online:
https://in.xero.com/BZmLkUvwzwhCJBZfyYP2LLLe5FHPI3hJ4cGreRja

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Demo Company (Global)

Registered Office: 23 Main Street, Central City, Marineville, 12345.
FINAL INVOICE
Tshingombe
Invoice Date
22 Jul 2023
Invoice Number
INV-0031
Reference
520
Tax reg
101-2-303
Orange Demo Co
:::Special Projects Division:::
23 Main Street

Central City
Marineville
12345
'Fish out of Water: Finding Your Brand 8.75% 18.34
Development work - develper onsite per day 8.25% 600.46
Golf balls - white single. Please reorder with code GB1-White 8.75% 5.15
Project management & implementation - branding workshop with your team 8.25% 230.95
Half day training - Microsoft Office 8.25% 461.89
Golf balls - white 3 pack. Please reorder with code GB3-White 8.75% 13.79
Company Branded T-Shirt Small Black. Check out our website for other offers! 8.25% 36.95
Project management & implementation - website revamp workshop with your team 8.25% 277.14
Development work - develper onsite per day 8.25% 600.46
Project management & implementation - 'due diligence' stocktake of your project scope/schedule/implementation plan/outcome measures (hourly rate as agreed)
8.25% 97.00
Subtotal 2,342.13
TOTAL CITY TAX 4% 92.20
TOTAL STATE TAX 4.5% 1.67
TOTAL STATE TAX 4.25% 97.96
TOTAL CITY TAX 4.25% 1.59
TOTAL USD 2,535.55
Due Date: 22 Jul 2023
Online payment ONLY - BILLPAY direct to our account 090-8007-006543 please.

nvoice INV-0032 from Demo Company (Global) for Tshingombe

Inbox

fiston tshingombe <messaging-service@post.xero.com> Sat, Jul 22, 7:25 PM

to
me

Hi Tshingombe,

Here's invoice INV-0032 for $USD 2,535.55.

The amount outstanding of $USD 2,535.55 is due on 22 Jul 2023.

View and pay your bill online:
https://in.xero.com/cuE07phniMGstHcPXqseCfWDohr6JRZocF1G0zft

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Demo Company (Global)

Registered Office: 23 Main Street, Central City, Marineville, 12345.
DRAFT
Tshingombe
Invoice Date
22 Jul 2023
Invoice Number
INV-0032
Reference
520
Tax reg
101-2-303
Orange Demo Co
:::Special Projects Division:::
23 Main Street
Central City
Marineville
12345
'Fish out of Water: Finding Your Brand 8.75% 18.34
Development work - develper onsite per day 8.25% 600.46
Golf balls - white single. Please reorder with code GB1-White 8.75% 5.15
Project management & implementation - branding workshop with your team 8.25% 230.95
Half day training - Microsoft Office 8.25% 461.89
Golf balls - white 3 pack. Please reorder with code GB3-White 8.75% 13.79
Company Branded T-Shirt Small Black. Check out our website for other offers! 8.25% 36.95
Project management & implementation - website revamp workshop with your team 8.25% 277.14
Development work - develper onsite per day 8.25% 600.46
Project management & implementation - 'due diligence' stocktake of your project scope/schedule/implementation plan/outcome measures (hourly rate as agreed)
8.25% 97.00
Subtotal 2,342.13
TOTAL CITY TAX 4% 92.20
TOTAL STATE TAX 4.5% 1.67
TOTAL STATE TAX 4.25% 97.96
TOTAL CITY TAX 4.25% 1.59
TOTAL USD 2,535.55
Due Date: 22 Jul 2023
Online payment ONLY - BILLPAY direct to our account 090-8007-006543 please.

Invoice INV-0023 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Wed, Aug 9, 3:49 PM (4 days ago)

to
me

Tshingombe

View invoice

R1,360,532.80 due 3 Aug
INV-0023

Hi,

Here's invoice INV-0023 for ZAR 1,360,532.80.

The amount outstanding of ZAR 1,360,532.80 is due on 03 Aug 2023.

View your bill online:
https://in.xero.com/BR6McJvy3PkZcR8NaKh31IzqNml7BLuMSLG5B3Pc

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
TAX INVOICE
mmsale@shoprite.co.za
Invoice Date
3 Aug 2023
Invoice Number
INV-0023
Reference
2500
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Education technology, and Education engineering 1.00 20,000.00 15% 20,000.00
Education pedagogy tech, Engineering, 1.00 20,000.00 15% 20,000.00
Education training, trainer engineering, manufactu 1.00 20,000.00 15% 20,000.00

Education,trade educare, manufacture,used 1.00 30,000.00 15% 30,000.00
Education, manufacture,license building handbook 1.00 259,000.00 15% 259,000.00
Edu professional,license handbook buildings 1.00 25,000.00 15% 25,000.00
Educ , certificate building,hand book,license buil 1.00 25,000.00 15% 25,000.00
Education management,quality insurance 1.00 258,336.00 15% 258,336.00
Traine instruction book Engineering, manufacture 1.00 258,000.00 15% 258,000.00
training I struct license ,and policy ,safety prod 1.00 25,800.00 15% 25,800.00
Instruc, code composite, consti, commission norm 1.00 205,600.00 15% 205,600.00
Instruct ,trainer,composite ,matter,safety , commi 1.00 25,900.00 15% 25,900.00
Instruc issue,license ,certific ,policy frame, 1.00 5,236.00 15% 5,236.00
Instruc ,indicator defense factor,step,oper,sfet w 1.00 5,200.00 15% 5,200.00
Subtotal 1,183,072.00
TOTAL VAT 177,460.80
TOTAL ZAR 1,360,532.80
Due Date: 3 Aug 2023

Invoice INV-0033 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Wed, Aug 9, 3:49 PM (4 days ago)

to
me

Tshingombe

View invoice

R115,103.50 due 12 Aug
INV-0033

Hi,

Here's invoice INV-0033 for ZAR 115,103.50.

The amount outstanding of ZAR 115,103.50 is due on 12 Aug 2023.

View your bill online:
https://in.xero.com/2DJ3qSg6u1X7h1gvAK9zd5IBzsca9VdbEgReYGul

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
TAX INVOICE
mmsale@shoprite.co.za
Invoice Date
6 Aug 2023
Invoice Number
INV-0033
Reference
25880
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Training technology information 1.00 100,090.00 15% 100,090.00
Subtotal 100,090.00
TOTAL VAT 15,013.50
TOTAL ZAR 115,103.50
Due Date: 12 Aug 2023

nvoice INV-0025 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Fri, Aug 4, 4:30 PM (9 days ago)

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
TAX INVOICE
mmsale@shoprite.co.za
Invoice Date
6 Aug 2023
Invoice Number
INV-0033
Reference
25880
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Training technology information 1.00 100,090.00 15% 100,090.00
Subtotal 100,090.00
TOTAL VAT 15,013.50
TOTAL ZAR 115,103.50
Due Date: 12 Aug 2023

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
TAX INVOICE
mmsale@shoprite.co.za
Invoice Date
6 Aug 2023
Invoice Number
INV-0033
Reference
25880
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Training technology information 1.00 100,090.00 15% 100,090.00
Subtotal 100,090.00
TOTAL VAT 15,013.50
TOTAL ZAR 115,103.50
Due Date: 12 Aug 2023

Invoice INV-0010 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com> Fri, Aug 11, 4:57 PM (2 days ago)

to
me

Tshingombe

Hi,

Here's invoice INV-0010 for ZAR 10,914,223.00.

The amount outstanding of ZAR 10,914,223.00 is due on.

View your bill online:
https://in.xero.com/3bJF65kn71T5aVYNyotW6aYAAT3yCSNAo0A0Ts32

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
DRAFT INVOICE
mmsale@shoprite.co.za
Invoice Date
30 Jul 2023
Invoice Number
INV-0010
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Research plan engineering type computer,time frame 1.00 2,000.00 No VAT 2,000.00
Research on low voltage distribution network opera 1.00 5,000,000.00 No VAT 5,000,000.00
Research engineer roles,skill,salary , responsible 1.00 5,000,000.00 No VAT 5,000,000.00
Research metropolitan police engineering, tpm ,con 1.00 400,000.00 No VAT 400,000.00
Police engineering,forensic technology,detective,i 1.00 400,000.00 No VAT 400,000.00
Research implementation framework qualifications 1.00 50,000.00 No VAT 50,000.00
Engineering trade council quality low criterion 1.00 20,000.00 No VAT 20,000.00
Implementation engineering electrical circular tra 1.00 2,223.00 No VAT 2,223.00
Diplomat engineering national implementation 1.00 40,000.00 No VAT 40,000.00
Subtotal 10,914,223.00
TOTAL VAT 0.00
TOTAL ZAR 10,914,223.00
Due Date:

Invoice INV-0030 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Fri, Aug 11, 4:57 PM (2 days ago)

to
me

Tshingombe

Hi,

Here's invoice INV-0030 for ZAR 2,872,878,647.40.

The amount outstanding of ZAR 2,872,878,647.40 is due on 06 Aug 2023.

View your bill online:
https://in.xero.com/SQi8eRqDoMYK7JUmNqqiAmWU5nQRDoSXoVk56q8D

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
DRAFT INVOICE
mmsale@shoprite.co.za
Invoice Date
6 Aug 2023
Invoice Number
INV-0030
Reference
26369
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA

Description	Quantity	Unit Price	VAT	Amount ZAR
Fiscal fraude,Min,max value , energie tax , engine	1.00	25,000.00	15%	25,000.00
Engineering chemistry, engineering physics, metall	1.00	2,000,000.00	15%	2,000,000.00
Engineering trade council quality low criterion	1.00	20,000.00	No VAT	20,000.00
Manufacture material conductor, cable,wire	1.00	50,000.00	15%	50,000.00
Engineering plastic ,metallurgie, geotechnical	1.00	2,345.00	15%	2,345.00
Engineering, construction civil,mecanic,const elec	1.00	345,654.00	15%	345,654.00
Engineering chemistry, engineering physics, metall	1.00	2,000,000.00	15%	2,000,000.00
Implementation engineering electrical circular tra	1.00	2,223.00	No VAT	2,223.00
Instruc , manufact, wire insulator ,code theory	1.00	259,000.00	15%	259,000.00

Instruct ,visa electrical ,meter energy, permit 1.00 25,000.00 15% 25,000.00
Instruct,visa ,markdept , license fiscal,license 1.00 258,369.00 15% 258,369.00
Instruct commission, council,visa passport id 1.00 25,000.00 15% 25,000.00
Instruc, bulletin,visa certificate,metering city 1.00 2,500.00 15% 2,500.00
Instruct commission, council,visa passport id 1.00 25,000.00 15% 25,000.00
Instruct com, visa wehit plate number, fiscality 1.00 258,800.00 15% 258,800.00
Research metropolitan police engineering, tpm ,con 1.00 400,000.00 No VAT 400,000.00
Police engineering,forensic technology,detective,i 1.00 400,000.00 No VAT 400,000.00
Supply and lay 3 phase cable.from boundary .metre 1.00 1,000.00 15% 1,000.00
Research engineer roles,skill,salary , responsible 1.00 5,000,000.00 No VAT 5,000,000.00
Fit ripple relay geyser,fit sub board to out 1.00 1,000.00 15% 1,000.00
Instruct commission, science engineering,PHY,che 1.00 56,999.00 15% 56,999.00
Business engineering 1.00 20,000.00 No VAT 20,000.00
Research on low voltage distribution network opera 1.00 5,000,000.00 No VAT 5,000,000.00
Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
Description Quantity Unit Price VAT Amount ZAR
Manufacture, drawing electric ,diagram ,panelcontr 1.00 3,400,000.00 15% 3,400,000.00
Engineering build ,mecanic, electric support 1.00 203,040.00 15% 203,040.00
Engineering,construct elect,substation,station ele 1.00 2,000,989.00 15% 2,000,989.00
Research plan engineering type computer,time frame 1.00 2,000.00 No VAT 2,000.00
Basic distribution board installation ,3 phase, 1 1.00 12,000.00 15% 12,000.00
Manufacture,stove,guyser,iron,kettle, 1.00 34,567,666.00 15% 34,567,666.00
Manufacture, component relay ,contactor,breaker, 1.00 28,760,999.00 15% 28,760,999.00
Manufacture,electrotech , electrotechnolgy, relate 1.00 209,000.00 15% 209,000.00
Electrical engineering sub contractor rate 1.00 90,000.00 No VAT 90,000.00
Engineering,quality survey ,geomatic 1.00 209,898,765.00 15% 209,898,765.00
Manufacture, engineering science,power machine 1.00 200,547.00 15% 200,547.00
Manufacture, wire premise,way switch ,panel wire 1.00 200,090.00 15% 200,090.00
Manufacture, light bulb,switch outlet socket, 1.00 200,989,878.00 15% 200,989,878.00
Manufacture, mechanitech,mechanitechnology 1.00 2,000,980,000.00 15% 2,000,980,000.00
Manufacture material semie conductor,electronics 1.00 500,000.00 15% 500,000.00
Engineering electrical database 1.00 6,589.00 No VAT 6,589.00
Engineering,Elec trade,load manufacture supply, 1.00 200,989.00 15% 200,989.00
Manufacture, washing machine ,fridge, air cooling 1.00 50,000.00 15% 50,000.00
Instruct,com,visa city meter ,plate , fiscality 1.00 528,809.00 15% 528,809.00
Manufacture,cell battery,Solaire panel, 1.00 200,045.00 15% 200,045.00
Education pedagogy tech, Engineering, 1.00 20,000.00 15% 20,000.00
Educ , certificate building,hand book,license buil 1.00 25,000.00 15% 25,000.00
Instruct norm, foundry mining, composition. 1.00 25,000.00 15% 25,000.00
training I struct license ,and policy ,safety prod 1.00 25,800.00 15% 25,800.00
Education,trade educare, manufacture,used 1.00 30,000.00 15% 30,000.00
Instruc bargaining commission, composition low 1.00 52,636.00 15% 52,636.00
Instruct commission entrepreneurs Elec rules 1.00 60,098.00 15% 60,098.00
Instruct, composit , switch, outlet, gold oxyd,hyd 1.00 25,000.00 15% 25,000.00
Instruc, drilling,turning ,foundry, paint , molecu 1.00 69,669.00 15% 69,669.00
Instruct,composit ,ph basic,acid,bpolicy , safety, 1.00 69,909.00 15% 69,909.00
Subtotal 2,499,582,408.00

Invoice INV-0046 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Fri, Aug 11, 4:57 PM (2 days ago)

to
me

Tshingombe

Hi,

Here's invoice INV-0046 for ZAR 125,814,380.35.

The amount outstanding of ZAR 125,814,380.35 is due on.

View your bill online:
https://in.xero.com/4SSskBCYGvr2ZcFx0nD6Kc9Thiee6ztYg1DbB4hQ

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
DRAFT INVOICE
mmsale@shoprite.co.za
Invoice Date
11 Aug 2023
Invoice Number
INV-0046
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Instruct,health clean biotech ,food,vacum tend low 1.00 50,098.00 15% 50,098.00
Instruct,inspect food take typical info,compos low 1.00 50,000.00 15% 50,000.00
Instruct,buotechno machine food cook,agro value 1.00 500,989.00 15% 500,989.00
Instruct, biotechnology, food beverages, composite 1.00 50,000.00 15% 50,000.00
Instruct,typic food nutrie ph ,basic,acid 7, GRA v 1.00 500,989.00 15% 500,989.00
Instruct,biomicrobiologi,scanner biochem,low 1.00 50,009.00 15% 50,009.00
Instruct,agro pastoral tools equipment,low 1.00 50,000.00 15% 50,000.00
Instruct ,policy safe biotechnology skill dev,Lo 1.00 500,098.00 15% 500,098.00
Instruct,food value Assessment Portofilio low,osha 1.00 500,098.00 15% 500,098.00
Instruct,book record sale cust ,exercise book note 1.00 500,063.00 15% 500,063.00
Instruct,book record sale cust ,exercise book note 1.00 500,063.00 15% 500,063.00
Instruct,book record sale cust ,exercise book note 1.00 500,063.00 15% 500,063.00
Instruct,order ob ,access book,log book,incid book 1.00 50,000,693.00 15% 50,000,693.00
Instruct ,booking record,control cash book, superb 1.00 5,000,069.00 15% 5,000,069.00
Instruct, biotech genie ,,agro, food composite,low 1.00 523,699.00 15% 523,699.00
Instruct,composit ,ph basic,acid,bpolicy , safety, 1.00 69,909.00 15% 69,909.00
Instruct,risk ass book,policy book,record,Manuel s 1.00 50,006,963.00 15% 50,006,963.00
Instruct , exercise book.library biblio bookeping 1.00 50,006.00 15% 50,006.00
Subtotal 109,403,809.00
TOTAL VAT 16,410,571.35
TOTAL ZAR 125,814,380.35
Due Date:

Invoice INV-0028 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Fri, Aug 11, 4:57 PM (2 days ago)

to
me

Tshingombe

Hi,

Here's invoice INV-0028 for ZAR 1,300,000.00.

The amount outstanding of ZAR 1,300,000.00 is due on.

View your bill online:
https://in.xero.com/aZH5SOVyBCUyGiHJvdq9MSnTXXUPCOVru9k71Rhu

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
DRAFT INVOICE
mmsale@shoprite.co.za
Invoice Date
5 Aug 2023
Invoice Number
INV-0028
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Instruct 1.00 500,000.00 500,000.00
Research metropolitan police engineering, tpm ,con 1.00 400,000.00 No VAT 400,000.00
Police engineering,forensic technology,detective,i 1.00 400,000.00 No VAT 400,000.00
Subtotal 1,300,000.00
TOTAL VAT 0.00
TOTAL ZAR 1,300,000.00
Due Date:

Invoice INV-0024 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Fri, Aug 11, 4:57 PM (2 days ago)

to
me

Tshingombe

Hi,

Here's invoice INV-0024 for ZAR 4,213,136,948.50.

The amount outstanding of ZAR 4,213,136,948.50 is due on.

View your bill online:
https://in.xero.com/lRU8vKeYGlZMrYtxpxAOQl6LD1JgedknDnzUhUVv

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
DRAFT INVOICE
mmsale@shoprite.co.za
Invoice Date
3 Aug 2023
Invoice Number
INV-0024
Reference
2500
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA

Description	Quantity	Unit Price	VAT	Amount ZAR
Education technology, and Education engineering	1.00	20,000.00	15%	20,000.00
Education pedagogy tech, Engineering,	1.00	20,000.00	15%	20,000.00
Education training, trainer engineering, manufactu	1.00	20,000.00	15%	20,000.00
Education,trade educare, manufacture,used	1.00	30,000.00	15%	30,000.00
Education, manufacture,license building handbook	1.00	259,000.00	15%	259,000.00
Edu professional,license handbook buildings	1.00	25,000.00	15%	25,000.00
Educ , certificate building,hand book,license buil	1.00	25,000.00	15%	25,000.00
Education management,quality insurance	1.00	258,336.00	15%	258,336.00
Traine instruction book Engineering, manufacture	1.00	258,000.00	15%	258,000.00
training I struct license ,and policy ,safety prod	1.00	25,800.00	15%	25,800.00
Instruc, code composite, consti, commission norm	1.00	205,600.00	15%	205,600.00

Instruct ,trainer,composite ,matter,safety , commi 1.00 25,900.00 15% 25,900.00
Instruc issue,license ,certific ,policy frame, 1.00 5,236.00 15% 5,236.00
Instruc ,indicator defense factor,step,oper,sfet w 1.00 5,200.00 15% 5,200.00
Engineering chemistry, engineering physics, metall 1.00 2,000,000.00 15% 2,000,000.00
Engineering trade council quality low criterion 1.00 20,000.00 No VAT 20,000.00
Manufacture material conductor, cable,wire 1.00 50,000.00 15% 50,000.00
Engineering plastic ,metallurgie, geotechnical 1.00 2,345.00 15% 2,345.00
Implementation engineering electrical circular tra 1.00 2,223.00 No VAT 2,223.00
Implementation engineering electrical circular tra 1.00 2,223.00 No VAT 2,223.00
Implementation engineering electrical circular tra 1.00 2,223.00 No VAT 2,223.00
Engineering elect, electrotech ,load EIC,norm symb 1.00 200,898.00 15% 200,898.00
Manufacture,control logic , engineering fund,syst 1.00 3,450,008,767.00 15% 3,450,008,767.00
Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
Description Quantity Unit Price VAT Amount ZAR
Marketing engineering 1.00 400.00 15% 400.00
Instruc issue,license ,certific ,policy frame, 1.00 5,236.00 15% 5,236.00
Police engineering,forensic technology,detective,i 1.00 400,000.00 No VAT 400,000.00
Engineering,gov social municipality metering energ 1.00 235,689.00 15% 235,689.00
Manufacture,cell battery,Solaire panel, 1.00 200,045.00 15% 200,045.00
Engineering, construct electric , electromechanic 1.00 239,000.00 15% 239,000.00
Supply and lay 3 phase cable.from boundary .metre 1.00 1,000.00 15% 1,000.00
Engineering,Elec , electromagnetic,AC,DC load 1.00 209,099,878.00 15% 209,099,878.00
Subtotal 3,663,652,999.00
TOTAL VAT 549,483,949.50
TOTAL ZAR 4,213,136,948.50
Due Date:

Invoice INV-0027 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Fri, Aug 11, 4:57 PM (2 days ago)

to
me

Tshingombe

Hi,

Here's invoice INV-0027 for ZAR 10,125,676.40.

The amount outstanding of ZAR 10,125,676.40 is due on.

View your bill online:
https://in.xero.com/2Xn6FrD4qm1ptFkspA2w37xCI3butA0DPI8LNrgP

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
DRAFT INVOICE
mmsale@shoprite.co.za
Invoice Date
5 Aug 2023
Invoice Number
INV-0027
Reference
,2569
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Instruct, commission electric , bargaining low 1.00 25,366.00 15% 25,366.00
Instruct commission electric engineering low, 1.00 62,336.00 15% 62,336.00
Instruct commission electrotech genie ruling 1.00 366,936.00 15% 366,936.00
Instruct commission, energie electric engineering 1.00 6,399,965.00 15% 6,399,965.00
Instruct, commission electromechanic rules 1.00 69,369.00 15% 69,369.00
Instruct commission entrepreneurs Elec rules 1.00 60,098.00 15% 60,098.00
Instruct, commission city municipal energie low 1.00 639,963.00 15% 639,963.00
Instruct commission mechanic,water hydraulic 1.00 63,399.00 15% 63,399.00
Instruct commission,construct civil build low, 1.00 63,999.00 15% 63,999.00
Instruct commission, science engineering,PHY,che 1.00 56,999.00 15% 56,999.00
Instruct commission, machinery labour lift Amanda 1.00 59,969.00 15% 59,969.00
Instruc, drilling,turning ,foundry, paint , molecu 1.00 69,669.00 15% 69,669.00
056693 1.00 529,996.00 15% 529,996.00
Instruct, commission 1.00 266,963.00 15% 266,963.00
Instruct,composit ,ph basic,acid,bpolicy , safety, 1.00 69,909.00 15% 69,909.00
Subtotal 8,804,936.00
TOTAL VAT 1,320,740.40
TOTAL ZAR 10,125,676.40
Due Date:

Invoice INV-0018 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Thu, Aug 10, 3:53 PM (3 days ago)

to
me

Tshingombe

View invoice

R4,217,298,024.85 due 9 Aug
INV-0018

Hi,

Here's invoice INV-0018 for ZAR 4,217,298,024.85.

The amount outstanding of ZAR 4,217,298,024.85 is due on 09 Aug 2023.

View your bill online:
https://in.xero.com/s44cswGmWZKWKRppC5gO9KNaZTqDTGFkdJ7tdJxh

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
TAX INVOICE
mmsale@shoprite.co.za
Invoice Date
1 Aug 2023
Invoice Number
INV-0018
Reference
200
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA

Description	Quantity	Unit Price	VAT	Amount ZAR
Engineering plastic ,metallurgie, geotechnical	1.00	2,345.00	15%	2,345.00
Engineering chemistry, engineering physics, metall	1.00	2,000,000.00	15%	2,000,000.00
Engineering plastic ,metallurgie, geotechnical	1.00	2,345.00	15%	2,345.00
Engineering elect, electrotech ,load EIC,norm symb	1.00	200,898.00	15%	200,898.00
Engineering elect, electrotech ,load EIC,norm symb	1.00	200,898.00	15%	200,898.00

Engineering, construction civil,mecanic,const elec 1.00 345,654.00 15% 345,654.00
Engineering, artisan,clot ,logistic, operational m 1.00 209,989.00 15% 209,989.00
Manufacture, mathematics engineering funct 1.00 2,578,987.00 No VAT 2,578,987.00
Engineering,gov social municipality metering energ 1.00 235,689.00 15% 235,689.00
Engineering,Elec , electromagnetic,AC,DC load 1.00 209,099,878.00 15% 209,099,878.00
Engineering elect,energy norm , industrial energy 1.00 2,099,989.00 No VAT 2,099,989.00
Manufacture,control logic , engineering fund,syst 1.00 3,450,008,767.00 15% 3,450,008,767.00
Manufacture, AC,DC machine motor,alternator, 1.00 200,000.00 15% 200,000.00
Engineering,Elec trade,load manufacture supply, 1.00 200,989.00 15% 200,989.00
Engineering, construct electric , electromechanic 1.00 239,000.00 15% 239,000.00
Manufacture, engineering science,power machine 1.00 200,547.00 15% 200,547.00
Subtotal 3,667,825,975.00
TOTAL VAT 549,472,049.85
TOTAL ZAR 4,217,298,024.85
Due Date: 9 Aug 2023

Invoice INV-0011 from Tshingombe for mmsale@shoprite.co.za

Inbox

fiston tshingombe <messaging-service@post.xero.com>

Thu, Aug 10, 3:52 PM (3 days ago)

to
me

Tshingombe

Hi,

Here's invoice INV-0011 for ZAR 16,053,983.00.

The amount outstanding of ZAR 16,053,983.00 is due on 05 Jul 2023.

View your bill online:
https://in.xero.com/8DKogichcnmPgYwAGUeeRnnUx0u8EXkmoWxjP2b2

From your online bill you can print a PDF, export a CSV, or create a free login and view your outstanding bills.

If you have any questions, please let us know.

Thanks,
Tshingombe

Registered Office: 1030, Jhb, Gauteng, 1030, South Africa.
DRAFT INVOICE
mmsale@shoprite.co.za
Invoice Date
30 Jul 2023

Invoice Number
INV-0011
Reference
2000
Tshingombe
1030
JHB GAUTENG 1030
SOUTH AFRICA
Description Quantity Unit Price VAT Amount ZAR
Engineering trade council quality low criterion 1.00 20,000.00 No VAT 20,000.00
Implementation engineering electrical circular tra 1.00 2,223.00 No VAT 2,223.00
Diplomat engineering national implementation 1.00 40,000.00 No VAT 40,000.00
Research plan engineering type computer,time frame 1.00 2,000.00 No VAT 2,000.00
Research on low voltage distribution network opera 1.00 5,000,000.00 No VAT 5,000,000.00
Research plan engineering type computer,time frame 1.00 2,000.00 No VAT 2,000.00
Research implementation framework qualifications 1.00 50,000.00 No VAT 50,000.00
Research on low voltage distribution network opera 1.00 5,000,000.00 No VAT 5,000,000.00
Research engineer roles,skill,salary , responsible 1.00 5,000,000.00 No VAT 5,000,000.00
Police engineering,forensic technology,detective,i 1.00 400,000.00 No VAT 400,000.00
Research metropolitan police engineering, tpm ,con 1.00 400,000.00 No VAT 400,000.00
Fit ripple relay geyser,fit sub board to out 1.00 1,000.00 15% 1,000.00
Manufacture engineering dimensioning low, high vol 1.00 100,000.00 15% 100,000.00
Marketing engineering 1.00 400.00 15% 400.00
3 phase ligthning protection
Supply and lay 3 phase cable.from boundary .metre 1.00 1,000.00 15% 1,000.00
Business engineering 1.00 20,000.00 No VAT 20,000.00
Subtotal 16,038,623.00
TOTAL VAT 15,360.00
TOTAL ZAR 16,053,983.00
Due Date: 5 Jul 2023

Re: Nieuwe inzending van bestel/offerteformulier FR

Inbox

T

TSHINGOMBEKB TSHITADI Fri, Jul 28, 9:14 PM

to Sales, tshingombekb, me,
tshingombetshitadi

Translate message
Turn off for: French

On Fri, 28 Jul 2023, 17:47 Sales, <sales@electro-test.be> wrote:

Bonjour,

Est-ce que vous désirez encore un offre de prix ?

Merci en avance et désolé pour notre réponse tardive.

Cordialement,

Gregory Lequime

Neem eens een bezoekje op onze vernieuwde website!

Jetez un coup d'œil à notre site Web renouvelé !

Lees hier onze - Algemene voorwaarden - Veuillez trouver ici nos - Conditions générales –

Van: tshingome <info@electro-test.be>
Verzonden: Friday, 5 May 2023 18:00
Aan: Info Electro-Test <info@electro-test.be>
Onderwerp: Nieuwe inzending van bestel/offerteformulier FR

Je suis*
Particulier

Nom

tshingome

E-mailadres

tshingombekb@gmail.com

N° de téléphone

0779685365

Rue + N°*

Hendrik Potgieter St

Code postal

1609

Ville/Commune*

Jgb

J'aimerais un*

- demander un devis
- commander un contrôle

Je souhaite les types de contrôles suivants

- Eléctricité
- Gaz
- Eau et égouttage
- Cuves à mazout
- Ascenseurs
- Energie
- Amiante
- Autres

Décrivez clairement ici les contrôles que vous souhaitez effectuer

Bonjour

Fast Metal Fabrication from Fractory

Inbox

T

TSHINGOMBEKB TSHITADI <tshingombekb@gmail.com> Wed, Jul 5, 8:59 AM

to Fractory, TSHINGOMBEKB, me, tshingombe, tshitaditshingombe

On Wed, 05 Jul 2023, 08:15 Fractory, <info@fractory.com> wrote:

Hi!

The summer holidays are here. And that often means longer lead times.

But worry not. Use Fractory to reach available manufacturing capacity with quick turnaround and competitive prices.

- Get your prototypes and small orders done right on the platform (**up to £2k is automated**).

- Turn to your personal sales engineers with bigger orders, from project to series manufacturing (**north of £1m per project** is what we've done so far).

Learn more about our capabilities **here**.

And below you'll see some of the projects we've done.

Get Your Quote

No longer want to receive these emails? **Unsubscribe**.

t

Re: MPC: Website Inquiry - Quote request

Inbox

T

TSHINGOMBEKB TSHITADI <tshingombekb@gmail.com> Mon, Jul 3, 2:02 PM

to Lori, TSHINGOMBEKB, me,
tshingombe

On Mon, 03 Jul 2023, 13:43 Brown, Lori, <lorbro@mpofcinci.com> wrote:

Tshingombe,

Good morning and thank you for your inquiry. A few questions before quoting:

1. Is this for an indoor or outdoor application?
2. What colors are required? Our Metalphoto Anodized Aluminum offers black graphics photographically sealed within the anodic layer. It provides 20+ years readability and abrasion resistance.
3. Is an art file available for quoting?
4. Are all the signs the same? Or are the graphics different on each?
5. Corners: Square or rounded?

If rounded what is the desired radius?

6. Mounting:
    a. Holes – how many, what size and where will they be located?
    b. Adhesive – what surface finish will the signs be adhered to?

Once I have this information, I can get the signs quoted.

Thank you once again for reach out to MPC. Sincerely,

Lori Nell Brown | Customer Relations Manager

Metalphoto of Cincinnati

513-612-4102 | lorbro@mpofcinci.com

Availability: Monday thru Friday 7:00 am to 4:00 pm ET

Click here to schedule a time to talk.

From: no-reply@mpofcinci.com <no-reply@mpofcinci.com>
Sent: Sunday, July 2, 2023 12:58 PM

Subject: [External]MPC Web Quote Request Received (Quote Request - Version 2)

What best describes the type of identification product you need?	Sign / Plaque
Which best describes the primary industry where the identification product will be installed?	Energy
Number of parts you want us to quote:	10
Part Width:	100
Part Height:	50
Part Thickness:	40
Does your item have variable / serialized information (i.e. each plate contains different info - barcodes, sequential numbers, etc.)?	Yes
Attachment	Good
Operating Environment	Engineering
First Name	Tshingombe
Last Name	Tshitadi
Email	tshingombekb@gmail.com
Company	Tshingombe
Phone	078689789
Address	Jhb 103 Percy rock view

Percy street
Yeohvil, Jhb Jhb
South Africa
Map It

Terms

✓I accept the Terms of Sale and Privacy Policy.

Division

Metalphoto of Cincinnati

form_type

183850000

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Re: UNEVOC Quarterly Issue #14 - June 2023 | Révue trimestrielle de l'UNEVOC n° 14 - juin 2023

Inbox

T

TSHINGOMBEKB TSHITADI <tshingombekb@gmail.com> Fri, Jun 30, 1:53 PM

to UNESCO-UNEVOC, TSHINGOMBEKB, me, tshingombe, tshingombetshitadi

On Fri, 30 Jun 2023, 12:05 UNESCO-UNEVOC Mailing lists manager, <e-lists@mercury.unevoc.unesco.org> wrote:

Dear Readers / Chers lecteurs,

Greetings from the UNESCO-UNEVOC International Centre for TVET!
We are pleased to share with you the latest issue of our UNEVOC Quarterly.
We also invite you to follow our activities via Twitter, Facebook and Linkedin, or visit our website for more news and the latest updates.

Salutations du Centre international UNESCO-UNEVOC pour l'EFTP !

Nous avons le plaisir de partager avec vous le dernier numéro de notre Revue trimestrielle.

Nous vous invitons également à suivre nos activités via Twitter, Facebook and Linkedin, ou à visiter notre site web pour plus de nouvelles et les dernières mises à jour.

Best regards from the / Meilleures salutations de la part du
UNESCO-UNEVOC International Centre / Centre international UNESCO-UNEVOC

EN | FR

Issue #14 - June 2023

Click for web version

Dear readers,

Young people have the transformative power to shape a sustainable and inclusive future. Yet, more than 270 million young people aged 15-24 are not in any form of employment, education or training (NEET).

In today's rapidly changing world, providing young people with relevant and marketable skills is essential for their personal development, employability, and contribution to sustainable development. Technical and vocational education and training (TVET) has a pivotal role to play in equipping young people with the necessary skills to smoothly transition into the job market and to actively engage in their communities and societies.

The Youth Declaration on Transforming Education highlighted that young people are at the forefront of pioneering innovations, mobilizing peers and communities, and advocating for universal and quality education. Youth skills development is also at the heart of UNESCO’s Strategy for TVET 2022-2029 and its mission to transform TVET for successful and just transitions.

Ahead of World Youth Skills Day, we encourage you to join the global activities to celebrate the importance of empowering young people to unlock their full potential, contribute meaningfully to their communities, and become catalysts for change.

Best wishes from the UNESCO-UNEVOC team

Latest news

23 June 2023

UNESCO-UNEVOC and WorldSkills launch TVET Youth Voices campaign

UNESCO-UNEVOC and WorldSkills International have launched the TVET Youth Voices campaign as part of their joint World Youth Skills Day activities. The video campaign features youth from the WorldSkills Champions Trust and the UNEVOC Network.

read more

16 June 2023

Survey for World Youth Skills Day

The survey invites youth aged 15-29 years to share their visions, priorities, aspirations, challenges, concerns, and expectations for skills development. The gathered insights will inform the discussion at a World Youth Skills Day hybrid event, which is being co-organized by UNESCO-UNEVOC and WorldSkills International.

Deadline: 7 July 2023

read more

15 June 2023

BILT Learning Lab presented by Fifty Shades Greener

BILT Learning Labs are an opportunity for TVET stakeholders to explore specific Innovation and Learning Practices from Africa, Asia-Pacific, and Europe. This lab focused on how Fifty Shades Greener, a woman-led TVET provider, is greening the training process in the tourism and hospitality sector.

read more

24 May 2023

UNESCO-UNEVOC and HP Life: Promoting skills for work and life

UNESCO-UNEVOC and HP LIFE have partnered to promote innovation, employability and entrepreneurship among youth, with a focus on Africa. The online courses are free, self-paced, and available in Arabic, Bahasa Indonesia, Chinese, English, French, Hindi, Portuguese and Spanish.

read more

16 May 2023

How Europe is addressing the digital education challenge: DigComp, DigCompEdu and SELFIE

This UNESCO-UNEVOC webinar showcased some of the leading initiatives aimed at the digital upskilling of both citizens and teachers. Speakers from the European Commission outlined how the frameworks have been developed, their content and how they are being used in different countries to support TVET.

read more

15 April 2023

Resilience project paves the way for stronger TVET

UNESCO-UNEVOC implemented a project titled 'Building resilience in TVET for a just and sustainable transition' to strengthen the resilience of UNEVOC Centres and other education and training stakeholders as part of the COVID-19 pandemic recovery process.

read more

6 April 2023

BILT Expert Group on the dual transition in the hospitality and tourism sector

In 2023, the BILT project has a new focus on the impact of the green and digital transition on skills needs for the hospitality and tourism sector and the TVET system. In this context, a BILT Expert Group, composed of 29 members from Africa, Asia-Pacific, and Europe, will investigate the implications of this dual transition.

read more

4 April 2023

Project learning forum on building TVET resilience

UNESCO-UNEVOC has been implementing the project on 'Building TVET resilience for a just and sustainable transition' to support TVET stakeholders and their vision for achieving institutional resilience. The Project Learning Forum invited participants to share key takeaways from the programmes and discuss what these insights mean for future activities.

read more

Digital Transformation of TVET and Skills Development Systems in Africa

Guidelines for countries to undertake a situational analysis

The Pan African Initiative for the Digital Transformation of TVET and Skills Development Systems in Africa ('the initiative') was launched on 9 March 2021. The initiative's overall objective is to create an ecosystem that will enable and accele ...

Digital Transformation of TVET and Skills Development Systems in Africa

Guidelines for countries to undertake a strategic planning framework

These guidelines follow the publication of Digital Transformation of TVET and Skills Development Systems in Africa - Guidelines for countries to undertake a situational analysis ('the Situational Analysis Guidelines'). In concert with the situ ...

Upcoming events

Updates from the UNEVOC Network

12 July 2023

Call for nominations – UNESCO International Literacy Prizes 2023

Online applications and nominations are open for the UNESCO International Literacy Prizes 2023. The theme for this year is 'Promoting literacy for a world in transition: Building the foundation for peaceful and sustainable societies'.

Deadline for applications: 12 July 2023

read more

14 July 2023

Empowering youth for a sustainable future: Building skills for tomorrow

This hybrid event, co-organized by UNESCO-UNEVOC and WorldSkills International, will showcase the positive impact of youth skills development on societies and economies, and empower young people to meet the challenges of an evolving global landscape through TVET.

read more

15 July 2023

World Youth Skills Day

This year's World Youth Skills Day celebrations will focus on the essential role that teachers, trainers and other educators play in providing skills for youth to transition to the labour market and to actively engage in their communities and societies.

read more

17 July 2023

Skilling teachers, trainers and youth for a transformative future

To celebrate World Youth Skills Day 2023, the Permanent Missions of Portugal and Sri Lanka to the United Nations, in collaboration with UNESCO, the ILO and the Office of the Secretary General's Envoy on Youth, are convening a panel discussion with Member States, young experts, social partners, teachers and educators, and other stakeholders.

read more

If you have questions or comments about the UNEVOC Quarterly, please contact us at unevoc@unesco.org.

Subscribe here: https://unevoc.unesco.org/home/register

Stay in touch

UNESCO-UNEVOC
International Centre
for Technical and Vocational
Education and Training
UN Campus, Platz der Vereinten Nationen 1
53113 Bonn, Germany

Contact us
unevoc@unesco.org
unevoc.unesco.org

Conn
Facebook
Twitter
Instagram
LinkedIn
Flickr

Policy safety secures body insurance engineering. / Group Edutech construct,check , osg ,pccsm, teamstep, meeting : supply

1.content : meeting agenda reviews guard job:

1.1.Section policy private investigator: intelligence systems term

annual report delivery bill framework regulatory mandatory compulsory investigation, management system. information management , system document ,
information circular attendance traffic in relation performance human resource community. Training
Engineering tpm: engineering meeting breakdowrepair maintenance meeting insurance body occupation body

Body insurance council private policy procedure conduct coverage report docket
1.2. section safety private and public government. Prevention defensive offensive ,low prevention justice low paralegal legal framework East ,pension tenure extension courts advisory justice low criminals low , legislation, theory safety practice safety fire health safety ,safety social.
Safety training authority engineering council engineering trade: occupation safety

-1.3 section secure :and security private public legislation guard sector officer patrol access reaction management supervisor , security system it security operations security guard court job work, security instruction training authority
Body insurance occupation

1.4: section .defense military operations. Defense force occupation engineering militaries defense system intelligence development ,body insurance occupation , logistics infantry militaries low ,police militaries Engineering scope , system engineering militaries ,combat body
1.5.section engineering studies business fuel engineering qualifications engineering council trade scope engineering trade engineering occupation engineering safe environment management plant labor engineering, electrical engineering, science engineering, mechanical engineering trade chemical industry
Insured body labour,dol engineering, body certificate check , recertification license competency meeting Unity safe police secure defensive.

2**.scope :policy safety secure body insured Engineering. Integrity unity meetings guard occupation body quality council visa permit certificate system, competency system**
qualifications system , engineering works place ,
Mission: integrity subject engineering trade industries safety engineering meet office body insurance occupation
Vision: integrity subject engineering trade object coverage shift project
3.purpose : policy :
-Delivery :report anual ,report bill ,
-Framework regulatority:mandatory judgement book legislation book project low policy judiciary health incident book charge
-management system information.information management
Database system document system: electronics book.docket system . investigation Portofilio agendacase book . performance:
Communication skill admni: report skill,
System . registration system indicator form policy complain form ,affidavit form attandance

3.1Purpose : safety
Safety book , registration attandance book,Ob book.occurence book.safety prevention book.traffic registration,health book

3.2Purpose : security registration attandance book ,occurrence book incidence book.access book . instruction book log book

3.3.Purpose : defensive attandance book , operational book. combat booking, low code military justice low book,fire arm registration

3.3 Purpose : engineering plant: registration engineering book.report engineering book safety secure environment book occupation book council engineering book affidavit book
Body insured book

4.requirement :policy studies material ,security safety tools formal formative sumative
Material humain resource material
-Credit.accreditation framework
Engineering credit accreditation time framework insured body complain.

5.Task step : engineering policy , engineering safety engineering secure and defensive Engineering, engineering council body health engineering challenge policy trade bureau act low relate correct engineering,correct safety,
6.operationel requirements task.
Occupation tools policy framework
Step recall policy safe secure defensive competency appeal,
-Preliminary operational engineering safety engineering insurance sized.
7 Meeting : coach
-Duty career job enquiries working
Operational seignor , principal,staff
-Duty policy insure evidence report record book :
Order duty conditions duty , complaints
-Resolution mediation facilities conflicts
Labour engineering body guard

Resolution engineering bargaining council.resolution council trade council engineering relation labour policy fault
Body council engineering.policy occupation, safety,secure mediation guard report resolution facility body discharge.

._ operationel cooporation: meeting engineering electrical.
Trade safety security engineer ,work Shoop tools hand safety ,premise bureaux safety regulator health occupation.osha ,sabs,sans,nef.
Health first aid engineering safety , Engineering management safety first report to supervisor injures damage incidence ,
Hasard factor hazard incidence.
-engineering plant mining safety fire work ,good house keep must Coleen Neary , key property electrical workshop machinery labour occupation government regulator hazard incidence key lock close circuit system personnel work .personal unauthorised entry Plante trade work shop,safety prevent, engineering management,discrimination risk Management asssessment quality product safety : safety system.
Incidence book.logactovity book.meating coatch . Access control riskpremisse,
-labour regulatority.
-engineering duty report to security prevent premises system severity value, impact financier system.
Engineering duty prevent explosion.plan evacuation engineering prevention risk assessment:
Engineering consignment point code colour property key .system
Government system offence crime
-engineering duty..
Security safety engineering.keep workplace patrol access control security physical armor body supervisor workspace .
-engineering policy meeting: information system to meeting coverage maintenance manufacture system package code drawing policy instruction framework regulatority investigation principle trial policy low relate term indeminty conduct hr resource policy engineering planning repaired break report prevention security property policy coverage act stationery occupation body recovery warenty court constable.infrastucture development policy delivery Amanda competency rating performance system record clearence correct bodybuilding.
-system fail to qualify quality council maintenance services,incorrect maintenance.
Log activities engineering policy meetick
Daily maintenance.order court low.
-defense militaire engineering system combating defense offence system misconduct dismissed ,

Meeting policy safety orders public Engineering low enforcement,low private sector reclaim.safety instruction correction maintenance.
Safety . Security officer,police officer,join indicator system docket system on book Manuel system record , affidavit officer engineering report claim breakdown, remanufacture re orders,police station, offence.customer care tools care employment system labour care engineering note case and resend police officer court guard judgement.

7.operationel duty .
Conduct ,qms components training system,policy no: amendment no: date June conduct in order and misconduct
-procesure dealing,,in the case dismissed, penalty..
Learner induction safety security open job close job submissions crime investigation principle,crime scenes and incidence, information management, administrative communication skills, vehicle crime investigation ,police law apply basic financial procedure ,apply humain rigth police environment, communication advance maintenance interpersonal,apply the principles business ,service delivery improvement: management the implementation of organisations strategies policies and plan in a public sector,hr management,lead and management team people manage workplace relations,managed induction of new staff, enhance the performance of emploi, management human resources procedure for public sector organisations, documents management system,Optimizer the utilities of information and visit for the purpose of assessment compliance and ensuring improvement of service, management of service, management operations,plan implementation, analyse tactical options for crow management, management tactical operations, demonstrate understanding of crime prevention, management crime investigation process for solving of crime , management the operation of community service centre CSC , management the prevention of crime,,work level total credit , Career .metre..
-check investigation subject: case I'd name ,marks assessor , moderator
-inveatigator must keep mind person speaking ,legal inquired cause circumstance of death,interview result,
Information complied analyse dismantled prevent, examination of body death,culture environment in how ,,
- diffential categories intelligence, misconduct,mention type of buy,
-draw a chart indicator step in court criminal case , discuss methods of transformation intelligence,
- autopsy,type ,nature death
-regulatory framework..manage implementation of legislation, explain following court
- roles design responsibility policing ranking.
-legsl action process service independent,purpose offence,offender presumed innocent rigth peaceful,unarmed, arbitration is Ccma, right protest demonstrate.
-critically analyst police forbid ,
Occupation health safety
Ohsa regulatority,duties employee commercant,
-basical financial procedure pfma
Service delivery resource government, activities,budget provide essential link management functions planing control..street police .
-principal of ethics to business environment regulation policy code.
8.information and documents management system
-optimise the utilisation of information system improve service delivery
-management inventory
-conduc evaluation inspection and visit for purpose compliance
Achieve the desired results or output.providr copies program project documentation instrument impact function officer evaluation.
Policies procedure implementation in order ,
-control evaluation correction commission, inspection report ,
Process that ensureactual activity corresponding to planned activities actually resuicompare,
-processby why compliance legislation department director instruction police ,national,
-are necessary in order to determine action have been implemented improve service,.
-noy resorting under the authority,
Level cammand inspection evaluation responsibility , objectivity process collect data analyse in order to determine the state of affairs,.
On arrival station evaluation inspection the leader inspection team , time ,
-first inspection is look previous inspection,
Inspection evaluation and visit to police compliance police framework.

9.human resource management, ehancethe performance of employment,manager the induction of new staff, management human resources process for public organisation.
-induction orientation social process integration the new employee into organisation and acquisitions him or the tail required the job .

- an induction organisation process manager.
-material video presentation is important the new corner understand .
- when written material and periode induction,formAl depending type information collected humans,
-in order for management to make process stressful is imperative.
-to encourage new employee ask .
Use a sketch indicate step in negotiations process,
-tio employee compagny.
-
10.vehicle crime investigation.
Vin , enginee number

8. Identify check , Vin ,engine number ,sP in,national motor vehicles information system, regulation,national road traffic act ,theftand robbery,call details record, parking aisles, monitoring..
-inforomant telephone or premise under electronics survey,separet from vehicle circular route ,call data record, law offence, appropriate registered,determine title holder appropriate authority , electronics system consumers value info ,south Africa police vehicles identification number, identification marks registered documents.
-fun tion of vehicles circular,reason , circular vehicle update, circular term ,assess methode importe ,
-manufacture builders vehicle identification process, number of vehicles term legal prescription,
9 crime scenes and incidence
- crime scene team completed activities crime ,scene manager conduct final walk .real evidence , gunshot residual fragile eviy collected , police court 48h arrest , national prosecution authority..
Force person sex costing money ,persons charge of case, police officer scene factor constitution firearms eviy stage search ,criminal evidence.
-criminal investigation,crime scene harasemknifr warenty arrest docket patrol, - fingerprint pattern type,methode securing crime , functions ..step of laying criminals charge ,
-road traffy operational legit .demonstrate knowledge and application health safy, demonstrate understanding principal of common law crime and statutory low offence, demonstrate understanding,
-cause stress life relation limited ,stresssfylife event often not precede a suicide, stress perceptual ability arise from comparison between demand , statutory crime , common low offence , societal stress
-road traffic operational traffic management.demonstrate the funcyof the vehicle circulation sysy relation crime invesy,demonstrate undersy,demonstrating control traffic,r type circular,motor vey,Ssessi g ,docuy different of different vehicle,informayneed ,
-radio procedure rules guaranteed effective functions, convey, correction, different traffic stops, general,pont duty rules area required point duty
-10. investigation and crime prevention methode, investigation crime or incident
De
- to restrict the mobility of criminals transport ,operation constly, implementation patrol time anLysr,police assign,create ,close contact base assumption, build , reduce contact public large , covert operations,Saturday patrol cordon search ,direct patrol ,selective ,foot patrol, illustration,roadblock,vehicle sporadic,crime scene manager process,control response management process ,eviy valide merits
.11.service delivery . manager service delivery improvement, management the implementation of organisations strategies policies and plan , diagram to depict service delivery , customer experience goal organisation try achiy, principal transformation public delivery ,ainternal external evaluation,key typical agendas action plan.post traumay,
11. Information management system.
Management inventory, optimisation the utilisation of information system to improve service delivery ,conduct evaluation, inspection and visit for purpose of assessing compliance ensures

improve of service,
-charasteristics useful information,brief disynational info ,risk overstock potential dagererous inventory,overstock ,function duty, database , funtion of management,
Spreadsheet manaytools change different input data ,operating soft prograydata process, system analyse descrub meet information requested use, presentation graphic, ,junior management control activities ,top management, middle, crime statquantitative collection, process analysis interpre.provide,
11. Information management,object simplicity,informer docket stat,type function

Safety security , criminals and procedure law ,basic security principal introduction to security at supervisor concept implementation introduction physical security procedure workplace introduction to access control inspection patrol and observations technology, security law criminals justice housebreak fraude damage property prejury ,private security act and ammunition and fire arm control explosion,criminal control access public premise criminals general orientation to criminals investigation roles security crime scene search control evidence write statement forma basic fire prevtsafety legislation control extinguisher automatically springs system, detection system security technology technical alarm CCTV x ,control apply technology ,security law , criminals just ice. Corporate invest termination roles manay invest report value basic interview corporate fraude case housekeeping duscipo..
12 department trade and industry private security crime relate security risk assessment, organisation, contingency planny,meaning typical emergency,guard industrial special service close protect, electronics induy control room surveillance, locksmith,private invesy, national,armed point management, training instructor,general provisions keeping of register and documents,offences Nd penalty repeal ..apply conduct manage,mdemonstratio. Understand electronics system alarms ,,fail to keep registration record term regulation negligence documents,quality council trade or assessment qualti function delegates premise accreditation occy quality, asssessor moderator apply certificate.mean registration

Ligthning protection,electric fence,stove electrical diagnosis,news installation,ligth,24 h electrique emergency, residential electricity, ligthning strike repaired,faulty plugs,electrical maintenance,electrical repairs rewiring swimming pool db board, commercial electric ,Cale fault testing faulty plugs , security lighting, garage door,gate automatic,fault ligth and plugs ,earth leakege tripping ,power outage failures, swimming pool motor,solar

14.Policy ,can lightining system database in ordering police conducted community safety officer security officer ligthning prevent safety machinery employee open system door gate prevent fault login prevention criminals fencing ,policy engineering planing meeting fault find fencing ,bid close Silverton insurance body visibility visited policy city power .policy can training trainer visited safety prevent result loading Shead , incidence crime security low resolve justice,policy introduction security low crime . private policy result evaluation tendered security accountability instituts security safety , accountability instituts police security detect death machinery safety prevent body ,policy resolve appeal body competency policy community , warenty evidence evaluation service delivery policy communication skill stress performance. Coverage plan guard term indenmity components database collected in order to evidence of crime . complaint affidavit report .police observe door open no door close no safety log indicator

12.technical evaluation physical security guarding contracts ..gov tendered.
. Eskom city power municipality.
- operational requirements.item details question score source score,
Company experience .
Manpower human resources 20/1009
Supplies screen candy supply have comphesive hr policy recruitment strategies secut psira ,,hr plan cover reteny criminals,screen hr partial ..
13 gov engineering.notice labours advisor council health and safety labour lifting operator ,chief ..scope ,definition eny duties of authorised bodies ,
- duties authorised bodies ,
Duties of accredited training provider
.- field of activities.
- training system document ration record retention training duration operator .life machine certificate code general explatory practical asssessor marks sheet ,accredited training facility return .mean deliver learner program authorised body approved chief inspector of driver machine regulatority, collecting evidence learn work measure judgement,body accreditation saqa response auditing qualifications specific funcy, authority body ,hold valid certificate competence Cary card , statement of results category equipment according.etqa quality management system.
- duty duty of authorised bodies.quality assurance standard accreditation ratification...number accreditation.number learn competency...
Training system document requested.operator valid carry card ,operator ,ration learn facility note excess 4hours theoretical instruction,1 hours practice assestunder 1:2 assessor supervisor.rarion learner facilities shall not exceed 12:1 theory .ration learner demonstration per machine n..
Up grade code operator regard certificate code..
Qualifications condition NQF level ,7datd ,24 month , qualifications saqa.
Counter balanced lift truck rated capay ..
- code descy..overhead crane pendant ..
Code specifical competency..
Machine make .machine code .compagny capacity ,Pre start check delete item .safety shoes boot load check components.
- Pre operational test ..
Theory question.penslties .maxiy
Total Pre start and Pre operational penalty , practice operating assessment..
Fail to release ,look direction ...total operating close down penalties time ..time 15 minim,6 penalty point minute assessment..Coe chief executive officer ..
13. Government notice occupation health and safety electrical machinery regulai Min labour ,safety act council health safety . occupation health ..mean material covered property prevent ..substay can not enter persons ,live ,portable tool appliance design , flexible cord supply , flexible cord ,carry hand
Electrical fence ,supplier any person who supply contract agree to supply.
-Scope of application.installer seller emplee.regulation apply generate transmit distribute electricite overhead underground the point . employment prove charge Condit good incidence .
Machinery dead electrical machines which May become live , work on disconnected electrical .
-temperature .leakage.working ..door gate opened extingy..persone authorise.
- electrical control gear..employee machinery contrill apparatus and protect.fault development such break fuse.neutral . distribution sytunlrss switch circuit breaker fuse so arranged ,oriviy .. employment switch gears intelock device arrange for cover , reclosing ..employer .
Switchboard totaliy ..opening kept close .
- manui installi and mainteyin accordey eny..
Motor cable item machine .. open close
Application reference regulatority certificate personal accreditation accompanying..cery compliance no type supplementary initial identi named premise GPS, coordinator pole number .offence imprisonment for maxi 12 month R200 , period 90 .. maintence fence ...
-

13: engineering body: information system,report ,factor consider new computer, financial methode buying computer .
- display option control changing screen save ,save data computer , network control panel network sharing ,change make computer done ,
-system defragmentation used display information,install program system control panel ,feature watch calendar installation options control panel, physical formatting high level formatting, Partition split,Ramm,ROM cache memory.house keeping.
-process converting information malware Ord data into a code especially prevent unauthorised access,
-software specially designed ransom disruption,damage or gain authority access to a computer system.
- hardware Ord software acting as barrier through information between network.fraudulent practice sending email from reputable campagnir personel information as password credit card number.
-type malicious software design access to a computer system until a sum of money is paid.
- infect boot sector of floppy disk master boot record .
Malware,Ransome ,firmware ,file inflect,Trajan ,fake computer,hack,phishing,boot sector,spam ,free wall, encryption phishing boot virispoo,
- new found traditional new social media or fake new web site not based on fact presentation.
- person who used computer to gain unauthorised access to data ,
- email message sent out in bulk aften for commercial pupose by net or network of virus infected computer,
Standard malware computer program that replicate it sel in order to spread .
Maliciouse computer program which mislead used camfirma,software utilisation,games,
- atemo to capture change and transmission an email so that message appear to come from .
Poor maintenance if item cause hardware problem two measures to prevent damage keyboy,mouse ,reason possible solutions problem..computer frozen area not response,computer is slow ,printer is not printing..format retrueview spreashed ..
- sales information system.
Marketing process identify service product and serymeet take garden..sale data to inventory and production system.
-sales file sales system , management report.data element ,sale store item number size unity price solde,item description.
-shipment and order inventory control syst . management reporting inventory statute ,item description.invoice data to general.accouny recession.management report account receivable again ..
- design record keeping employee record track emploi,job master file elemey ,hr ststy, termination report date name number position retired .
-employee record keeping system maintain data employee support transaction processing system TPS Ares basical business system ..
-management information system.duty mange middle interest Provident historical performance planing decision making level .-
Ordering .yes oredring system process yes, miss file data yes .miss yes managyreport .
Or product master files yes .material resource planning yes .unit production yes .miss yes.
Or account general lodge yes .yes expension.
- data organisation consolidate consumer produycoorporarion .product code ,code ..
PC analytical model database yes ,or ships files speeds capacity or fuel consuer cost file,ship charter hire , history cost files ,port expense file.
- decision operating fail PC workstation portal ,
- model of an executive support system hi system pooldata from diverse internal extert source and making the available

ideal ,..
- management information system miss yes decision support systems DSS.executive support system eds.transaction processing system tpd..
-operating system capacity computer .manage object manage ,security monitor .process mage .plug plog system .

Register auditing material irregularilarity.
Irrey ,action take ,applicable sancti
Failure to produce identify document , .action identification document 24h affidavit the script the subject already written marked result.
Failure of invigilator identify document,chief invigilator must report incident , will determine ,
Delivery of exam I,appear mark .used available .invigilation

,11..Body insurance.in case computer and information devices not working .storage unit arith logic unity calcul system control unit system central nervous .pair of signal that ..common bus s1,sum ,control slave device counter to command ,master device M3" 8 register units control memory ,rewrite 16 bit output bus ,selecty ,s,to sum sm =111 ,increment INR , accumulation AC execution register it instrument copy of instruction has implemented selection input , s ,s,s = are apple load temporary register tr receive data ,S2 load INR address gets input inpr ,8 bit ..
- list template,project statut priority pic data ,,

Issue tracking temple ,week time card time card calcul hour per project is poor koi track tampket.
- Portofilio management to track how meet investment created ,

Account status prices ,created Colum insert ,creating first data base ,store log query

11: defensive operationel:
-system engineering process management in dod acquisition , system process over view function allocation function architecture listed comprehensive.
-reuii analysis effort tracabity available primary task these definitely and illustrations.
Functionalite analysis allocate.function flow block diagram definition task sequence relationship time line analysis time sequence critical logit.
- design synthesis function deacrup existing and government furnished item use system reverse engineering existing components.
- verification ,functional analysis package of documents development to analyse time sheet requirements development to describe.
- system engineering process output.function allocation process levej basic functions required Transpo and communication showing as parallel, plan system analysis and control function ,work break down structure .function allocated form mission required load start move stop .
-configuration managy performance requirements a simple rule look draft . understand scop core has required troops in squad level unit over distance must ..
Technical review audit modelling, simulation metring
Source evaluation criteria factor rating score .technical requirements.
Performance character effective factory.
- design document.
Design approach .test evaluation approach, product support requests.
Production capabilities.
Production layout.
Manufacture process . quality control assurance.
- planing plan scheduled.
Organisation structure
Available personal resource
Total cost
Acquisition price., Life cycle cost .
- additional factors
Prior experience , past performance ..
- planning organising system engineering planing,
Production improvement stragiee.
Organisation and integration systems development.
Management consideration and evaluation criteria life cycle cost point.offer has include a complete.offer cycle analyse .offer plan ,supply resposable reliable maintence support available are they meaning fully system supplies ,phase contact category c contactor lock heed , contractor format it acceptable..
12- engineering electrical electrotech diploma ,select power rating of electrical appliances ,carry calcule energy installation , conversion determine cost ..
Installation procedure ,
Safety precautions application to non service generator , ventilation, refueling access requirements.
Ensuring commission the sets preparation insulation test ,plant proving test fuel supply is correctly installed.
All cable are secure and correctly connected earth Carey out , .
- apply safety methods employed during use electrical eqt, check the electrical cable .
Connecting from non service generator set to switch gear equipment.check to check load and interconnected cable,
- check earth system operate non service generator,
Apply all safety precautions part checked to incluy engine parts.
Identify the generator part convert during Pre start check.
Pre start check non service generator set according to manufacturer's instructions ,operate non service generator set according relevant technical publicy.
- apply load in accordance with safe wori practice.
Check and adjust generator set while..mainte steady frequency voltage shunt down generator , completed use documents fuel , knowledge how to maintence non service gent maintence princy,apply all safety precautions applicable mainy, .
Knowledge how maintence up date equipment prepaid record,
Instaynob service distribution system,install distribution cable
Install distribution unit feed pillstr ,unit operation occupation circulum install operate fault find on generator maintained emergency power generation equipment asssessor required, competency ,,
Lapds, install ,operate and test ligthiy and power distribution system ,
- state the design functionalite of lapds,state safety precautions ,eaethi requirements apply safety

16 job title security operations management.salary .job purpose ,roles responsabily physical coverage archive coirperate security policy ,budje property controlled
Budget ,security breach investigation disaster archive basis 24 x 7 day recovery , training appropriate level of tray I'd staff disaster fire bomb procedure .
- person specification: .
- explain the requirement for becoming security service provider ,objectivity private security ,security officer private to render , inspector may exercise in term of the criminal procedure act .
-outline the legal environment of a selected industry unity ,duty of director , responsible of secretary ,categories of security regulator framework meandering in house security investigation intelligence , advised monitoring signals from electronics security locksmith ,yes
- conduct a security patrol in an area of responsibility unit , physical security including any physical barrier prevents access perimeter fence walls security gate bulgare ,primary objecty of patrolling create a visible security presence as well as to create aworness to the fact that security active .,particular area security officer specific responsible, concerned dense using deterrence detection denial,inspecty premise sound fenciy screen window ,alarm warning ..break area infrared beam passive pir doit manage ,CCTV camera syst, detection effective security immediately security response ,scenario premise main building seconds building security control room , surrounding open area parking lots enclosed with fencr duty .
-found property following key ,safe keeping found property safety locked away in synch damage,record keeping,: default record should be kept of all found prot current.
Hand over any property handed block to the rigth occurs should security officer the control ..
-use security equipment,name baton analyse photography below different defensive manouvre ,list habdcuf guideline legal guideline type use suspect,pepper spray lacrymatory chemical compoitharbirritate papper spray cause tempoyblindntdd
, Identify components the two way radio principal voice proceedings use of bass principal,brief message must be brief and only , accurate details give must be clear ,security transmission RSVP mryth speed volume pitch , over message completely.
Hand held metal detector battery operated ligth ,metal indoor noutdir device are typically...body armour. Manufacture battery diffet new battery b.pre check. Lamp ,check battery post lamp post shift baton m.. maintence visibility..booked, supervisor book
- perfoi hand over and take over responsibility ..
Order security system operate Cary duties secury response outcome mainy.fire arm control register movement fire arm issue ,control docuy safety mememy,prepare duty take over shift check resource,step hand over procedure step book ,Ob book rwiten between guard special equipment fire arm serial number magazine quantity.
,Warming condiy all materials asses buly vertical physical inspection .
- procedure asses workplace arrange documentation,completed site inspection ,complet ,correction actioneur as required,report non conforming and unsafe sign take over,point satisfied.
- identify handle and defuse security belated conflict , managerial action that cause workplace confliy,poor commit,the alignment on the amount resoy insufy personal chemistry incluy value ,step probly.verbsk aggression charge posture stand taller , position advantage safety balance , officer communication verbalization listening, appear inducay report under influence ..
- carry out basic aid treatment in the workplace ., treatment for sprain strain recommend recommend.producy item first aid,
-apply occupation health safety Nd environment principle.
Hazard source exposure destroyed damagt body risk hazardous b,risk assessment process evaluation risk hazard .phyyhazard ligth vibration ionisaryon workplace premise,type inspy Pre operationel check equipment work,unsafe use tools equipmy,an inciu cause ,accident invesycause legal
- write present sign text for range of communication ,scenario re complain serviy..sender encode message environment decode feedback received,task requirements ..
Coach a team member in order to enhance individual performance in work environment, business coaipracticr support advice indiviy group , build streig equipment tack area important, sponsor mentor approise model teach ,staff members nsteo counseling process ,catch with clarify value enhance motivation ..

-write security report and take stay.communication fact as obserd deponent in farm statement reason why statement taken elicit informatywitnesd vitic written record checked investyaction take assis exam witness court justices future discipline..
- security electronics management,Xray ,CCTV,radio ..security vehicle safety security trade authority training ..workbook
Evaluation physical,
protection VIP , polygraph collect Deb ,buacery guard body guard ..

Normal conditions speed study typically,road ways location where traffic control type conducted ,road ways the recently his change the speed limits or existing speed location traffic control device location collision,normal conditions safe speed percent,
-traffic management and enforcement, find percent total number ,round result nears substrate the cumulative total result final total number of vehicles travelling each speed classification was 66,6mil ,proper study speed max Min ,posted speed that requires reflection, traffic control potential cause determine,speed delay studies.determine variation land marks record map .control regulation traffic invesysu next , evidence collection item collection recommended packing ,toool marks,remove frame fence other ,buildiy material insulation material collect sample other material contsi residue of damage area or residue as possible package small trace evidence putting ..
-hazmat legend DNS chemical area chemical search methods ,a variety of search methods can be employed at crime scenes and incident site the specific method process mission of judge commander responsible justice unit militaire advise judge ..
Layer documents of the layer photogra sketch package container collect place , place struck side burn papper difficulties to collect expert ,
- cybercrime : are offended targeting or using information technology PC newwork crime extortion fraudulent racketery trafficking criminals exploits modern attac maliciouse soft with hacking service spamming device ,personal identification , credit and debit card data ,bank account informay ,brokerage account info counter identify cyber fall to following, network intrusion relate offence national security
-low enforcement term mission provide Dian evidence storage emergency response coordinator police shift change patrol debrief, activity ,restore and supervision guidance ,area operationel police first line ,do executive command senior strategy..
- response activities disiry information on trend analysis date ,24- h ,7 day,
Task activity.
Complaint level complied days hours time the crime or complaints occured day
: Of the week the crime or complaints occureet..time number.
14.Research methods defensive,a.
Application, general, government documents, specifications,standard,other government, documents drawing,order of precedence, definition, assembly,commercial,governy,shelf cots products ,contained,decalman,design activity, documents, functionalite marking,join electronics type designation system, manufacture identification, NATO supply code manufacture , nomenclature,order of precedence., Part or indentification number pin,
- procurement instrument indentification number,STD, selection item seuence markings,
-general general,name lature, government names,type number joint electronics typed, designation system,army . identification, procurement instrument,special characters, identification marker equipment, exception to table ,limited multiple used of unit pack ,
- reference designing Gover number ,reprocuremeny ,detail type designation electro tube electrical electronics ,part and printed wiring board, name plate data ,special characters ,marking warning label high voly voltage notice ,radioacy material ,ion ionising radiation technical, caury,
- schematic wiring and cable chassis ideny modification work order sensitive device ,type number type designation, marking process marking surface other wood surft, size and for ,labels , material and process ,radius of corners maintenant,spectral glass opcity permanency durability..note use issue mark..serial ..
14 management systengineering process engineer process , required functions analysis and allocay , design synthesis,verify, systeme engineering process,system analysis and control .work breakdown structure,technical review modelling and simulation metric ,risk may,
- planning organising and management,system engineering planing product improvement ,contractual ..
14.1. system engineering fundamental
General ,application,defiy,reference ,facility ground system ,power distribution system,electrical noise in communication system,
Bonding shielding and grounding relation shiprs crime
- groundi safety practices ligtnydischage,fault protect,noise reduction, resistance required department defense , environment resistance measy technique ones electrode method four terminal ,
- earth electrode sub system , ground rods,buries grids plate metal frame work build ,incidentiak ,
- resistance properties.
Simple isolated electrodes drive rod ,other commonly used resistance multiple,two vertiyroa horizontal grid vertical rods connected grid,transient impedance of electrode,effects homogeneous,hemisphere electro, vertical..methode measure resistance ..
Ligti protection, phenomenon influence strike like attractive structure less meter flash mechanical thermal effect,conducty impedance effect ,inductance ,capacitance ,fault protection ..

14..Qms management..police practical learner training police visit patrol,arrest procedure search procedure , evidence collection type of evidy operate in teams during patrol use of surveillance meter cover action facility and prevention under cover operational persual informant register recruitment methods attend informany briefing session.
How to handle the gun and shooting technique, preparation of case dockets when opening cases of reported crimes ,drill or marching and soliting compliment,
-development project programme and policies are typically design to create change to target beneficiaries...polycy learner record data based ,policy ncv policy asssessment judgmental status of learner assessment continue basis , assessment practice student examinator content skill value ,time assessment policy act continue ..
-lesson plan for .grade learn outcome assessment
..topic learning outcomes.
Topic or then
Community and society .
- learners activities: ..
Core content subject issue, /resources subject topic issue article /// assessment debate investigation case study ,class work homes practical application,///asssessment tools checkly rubic memory..topic them ,priore ,educator , physical education task

16 policy . tendered
-technical indicator description,ensure koi an kpi: percentage number of dwelling provided with connection to main electricity supply by the municipality the number of new residents electricity connection dwellings provided by the municipality, measure average length,
-short definition: provide a brief explanation of the indicator with enough detail to generate understaking indicator.
-purposs and importance: explain wath indicator intended show and why it is important,
-source collection data , description data , describe where from and how it is collected,
- methods of calculation description: clearerly specify how is indicator calcul,
- data limitations : identify any limitations with indicator data including factythat might beyond depat,
- calculation , identy whether reporter performance cumulative,
-reportinf cycle : dentifie indicator is report quarterly annut.
- new indicay . Indentie whety the indicay is new significant change continue without chi.
-desire performance indicai response .
Entifir whether that higher or lower than target performance Ce is engineering responsi..
Sustain customer interrupted during y measure period.
- repair maintenance to prevent breakdy and interruy service delt..
- target 12 month , average time takey repair logged,average time taken to repair logged streelogy queries secondary main aterisl area ligthning perceu resolution loggi illegal connection queries 30 days ,multy properties percentage resolutions percentages metering domesy read download file average time take interruptions planned interruptions..
17. Policy engineering: Tpm implementation and stability.
General inspection category and training schedule carried auditing modified is additional training practical application,
- cycle of training application auditing,
- step may take a long time completed all operator must develop the ability to detect abnormal position results achieved,
-autonomous inspection, step #tentative inspection standard compared reevaluated to eliminate any inconsistent.
. Detection treatment of abnormal Cindy.
Minor servicing of machine ,mold,jogs and tools.
-organization tidnrss autonomous maintence.
Focus operator responsible , measure instrument, equipment precision, operation and treatment, element organisation for operational resposable adhere recording,promote organise and orderly operation control work , inventory measure proof device Sur function,operator must check .
- maintence activities base on .new equipment,data yes equipment lodge maintence, components inspection yes,reavalution of maintenant up dating yes ,
-equipment ledger files yes ,component inspect yes,
- breakdown count counter measure safety improvements.
-yrs report monthly inspector result ,yes unfinished, activity yes break down, analysis maintence resui and data activities yes ,terminal monitor, equipment and machyyrs,part yes, maintence history yes, similar breakdowrepair,yes data base yes , period maintence,maintenay inspection file, breakdown yes invoice files
Mid term maintence scheduled yes, monthly equipment inspector file,
List a,lisb maintence.
-inspectiins during operation abnormal yes, breakdown yes, yes components inspecy,yes scheduling ,yes ordering proce,yes maintence, execution,check maintence, breakdown invoice file , product schedule produ, ..
- steep automouse developing autonomous maintence step, required day, subject, element.
Circulum basic equipment the basic equipment technicien training course ,
-step development early equipment management activities new management activities new equipment is installed problem ,
- autonomous maintenance cycle audit summarise report distribution yes ,yes audit display results promotion committee ,small group evaluation results countermeasures, evaluation and plan auditing category, reflection and planning ,of small group activities, SM,
- top management plant yes, auditing request yes, report small group activities yes, upper and middle management inspector review discussion,manager present review to management,small group leader request auditing step ,yes Audi schedule prepare, workplace auditing by all sections chief Audi meeting decided consensus ,focus clarify management support.
-pm analyse dry battery process phenomeb falling on revolving table.
- description loss of balance accompanied shift of center of gravity,basic conditions creating friction

17. Policy metropolitan . metropolice, specifications, number vacance ,contract ,vision job advert band crime plan changing operationel demands affect the size ,make up deployment fleet the met are currently exploring option to support the acceleration decarbonisation to achieve net zero ,carbon 2030, over 750 alternative fuel vehicles already zero -emission capable e transition away from reliance on petrol diesel 5000 vehicle ,@000 pedal cycle , 25 Marin vessel officer and staff to carry job workplace safety environment for transportation public personal,
- vehicle depli range of duties general,
Purpose ,car protected public order carrier, motor cycle armed response cars poursuit,car personal plant respond to emergency.
- motor cycle,armed response car ,poursuit , prison plant , responding to emergency,
- mall fleet services provided professional.
- roles specifications engineering will identify the user roles requireded to e technical requirements to .
- key responsibilities.
Development vehicle conversion specifications custome relation ship vehicle role requirements and negotiate with contractor to ensure vehicle equipment ,meet duty money.
- acting as design authority development maintence statement detail building.
-accountability final inspection sign build to ensure documents correctly.
Performance assessment mps police construction legy analysis approi and support relevant engineering change request custome including CAIR,change modii or fit additional e ,to in service vehicle affected, decision performance marketing research acty as vehicles conversion , ensuring any technologie development, implementation applicable to equipment of police vehicles meet or improve operationel capability,and improve,safety maintence respected to vehicle.conversiin ,liaise and stakeholders at all levels, ensuring vehicle design or building queries are resolved,
- take initiative for monitoring and implementation continuously improving activities accross business metropolice career , activities across business v,metropolice career essential roles, qualifications guild motor vehicle b, electrical engineering complete ignition,
-; knowledge design good understanding AC ,dv electrical , principle on sysy.
3 resultat constable b, sergeant promotion ..
_- policy meeting career vs career engineering resolve media.

17. Policy,division technology management services,NQF 6,4,3: principal basic electronics installation frequency modulation, trade test rope advantage,
- core functions: to conduct repair installation,removals and maintenace of radio equipment for saps radio technical unit, to radio infrastructure installation at saps radio high sites,
- to conduct prevention maintenace at SAPS .
- to work and performance operating test equipment communication monitor , signal generator, oscilloscope.
-to analyse and trace radio infrastructure fault general.
- only the official application form development for is available form all police application , application adhere previous crime..reject correctly form..
Bid invitation indicated
, contract , description: approval service of approved inspection authority to perform occupation exposure level survr in term the occupation health and safety bact of 85, at the division detective and forensic , service for components s criminal record and crime scene management and forensic science . laboratory national test prevention health ,,-private police to saps social support tende .
.radio ,information system radio saps information CCTV ..PC saps
Community police saps house home logistic base db box D's saps metering saps police station central ,batteries motor energy saps and security. Emergency , substation .generator ..

-Gun license competency a0eal procedure ¹,

1.manpower requirements traffic signal..electrical and electronics engineering professional traffic signal ,involve use of digital most traffy advance telecommunication and data transmitted, system installation mainy repair knowledge workers,
Typical purpose: electrician work signal electrician qualifi,, professional engineering technology , qualifications electrician,line workers, assistance worker , administration. Responsi manager and control of the electrique side traffy,electrician responsable maintenant repaired component, electronics responsable traffic signal worker understaking task lamp ,replace ,cleant of lense paint of post , management, supervisor and control of all aspects related to the electronic side of traffic , management and control of personel material spare tools ,
- keeping of record of all activities and inventory control,
-budgeting for new installation maintenance and repairs of all traffic signal equipment,include controller and computer, installation,updrading , modification maintence, supervisor and control , contract understaking private actor, inspection installation during various stages, completed, investigation new development, provide advice.
Planning and implementation maintence plan priority, training personel.
-staffing level to run traffic signal division exactly signal installation utilisation area
traffic ,persons ,signal across staff level for road authority ,work 1,,760 signal of x hours level staffing= a road authority ..
Qualifications consultant engineering and contractor .
The installation of traffic signal significant amount of planning and designing by skill knowledge attention to detail ,
- warrants for the installation of signal .signal meet the queen length the investigation of signal site and installation of traffic, traffic signal , commissioning the road authority accept responsibility for traffic signal operation during commissioning phase of the project.
, Request many ,requested from decision engineering and technology in the employment road authority can also , observations over short period of period of during peak ,inspect visual to establish whether it is likely be inspected visual established whether traffic signal warrant,
- warrenty study.
Understanding to establish whether installation of traffic signal warrented according.
- indemnity insurance a road should infact insist insurance as part of contract between the authority, traffic signal commission responsibility technology road indemnity..
- risk management traffic signals the available professional b.. traffic operational..civil engineering disciplines junction work vision traffic engineering,, installation design layout junction computer cad

18.signsl design warrented at junction or crossed design proced traffic understaking survey work proper land survey relevant information, property bfence,carriage median existing road marking,paved sidewalk, driveway, drainage structure,plants and vegetation including location size , and spread largrriad side ,retain walks , adjacent building height, bridge Rd retaining wall fills cut ,it is important that attention possible geometries improve junction during,the design phase the particular attention, provided auxiliary particular right,turn lane ,but also possible left ,turn lanes ,site visited inspected visited survey relevant information undertank correct,.
-. Geometry design road , traffic signal layout plan antilever ,loop detector and control ,duct diagram , indicating the position of duct and draw boxes . existing engineering services plan relocation, traffic signal timing and phasing diagram.. successful traffic effective supervisor during installation,,
Inspector approved technology.typical engineering civil work underground,ducts draw footing ,detector loop, signal post and overhead installation,traffic signal head,electrical wiring and conduit,cabinet and control equipment,electrical connection,test of installed signal particular attention must given contract adequate record keep , progress installation ,delay carefully documents,report daily diary keep information logged information stat report , commission final Duran this check signsk plan test signal inspect proper operation ,test averting during the test period ,to assist with commission of signal the check list should and special ..
-Junction officer peace selective traffic low enforcement constitution low , criminals low ,traffic legislation define legal mean driver motor vehicle driver motor,vehicle license motor speed implications event offence event accident, criminals procedure.
- of justice contemp of court prejury subornatioj statement under oath ,law of evidence . , Traffic criminology object road traffic offence activity,,
Traffic management system department safety security management..
- traffic law enforcement offence code , accelerated over freeway ,accelerating passed,adult minor weir seat belt allowing documents,altering ,chassis number ,axle mass load,animal free low,block interesting ,Brak. Ligth, concer,couterfeling ,disc dangerousr ,defective body car party,,disregard bus lane reservations environment,,,injure driver failing ,,fail to comply with instructions ,display license furnish register authority license to court register operator ,stop vehicle traffic ,director documents inspection .keept part car,follow closely ,, illustration window,lamp emitting ,load coming load , obscure to.. unlicensed driver a motor, unspecified,used vehicle mass, examinator or testing ,, confirm,contravention ,relevant legislation
Title hold fail to notify appropriate registration authority,fail to submission registration authority,fail to notify appropriate register ,unftnessof motor..
18.policy guard motor .mechanical breakdown insurance benefits of this the insurer does reserve the right to accept or rejected policies at their discretion depending on the assessed.
- statement of the admnistrt. Warranty appointment claim undertakes to administer warrenty in accordance with term and condition as policy.
-in events of mechanical failure or breakdown relating to your vehicle or any other query policy ..
- mechanical condition, have a valid roadways certificate,have gross vehicle mass of less than 3600kg. Warenty conver all passengers and light commercial vehicles maximum carrying capacity of 1200kg.
-service required: warranty cover servicing routine maintenance or accident damage.
,Petrol ,diesel.
- failure to service the vehicle accory to the manufacture sprcii and interval render policy insured have doubt please contact .
Petrol and diesel vehicles maximum service run over 1000km., 39 day occurs register full.
Invoice insured..
Policy holder maker selling facut.
-police commencement date.policy purchase start date scheduled, if the vehicle subject still manufacture maintenance plan.motor guard vehicle upon expire insured inform administrator when vehicles reaches manufacture warranty maintenance plan expire km occur before expire date ,any failure occurred within first 39 days of policy purchase must be referred to the selling dealer in order to provent any inconvenience relating to administrative process .be delay the time between the sale warrenty and the capture of policy ADM..
- replacement of components: deponent on the cost cover used components not fully reconditioned fitted to the vehicle without prior authorisation.
-claim procedures , event mechanical failure occurred within 39dayd following purchase claim must referred to the selling..covered item ,the insured ,
- disassembly any components to establish the cause or extent of damage it insured respoability to authorise disassembly , administrator shall authorise any diagnostic work or claim prior to being advised of the cause of faillure
- repair work carried out without prior authorisation from administrator not covered by warranty,

Policy ,: referral to appropriate legal counsel. I general legal advice service call choice counsulta.
- tax advice ,Sao will provide advice and information pertaining to current tax law advice requirements for tax submission completion ,tax return form should you specify queries related to your tax submission or completion,tax return form queries relate way .
- motor guard policy proposal form premium
Silver R5000 , golden ,R6000, titanium 7000, vat and tear restrictions waiver .
Polycy insurance: to claim or not to claim .. working whether gain or lose .
-whi caused accident.insure compagy accept liability blame ,second claim discount recovery ,
- the knock for Kock agreement.claim settlt agreement policy compagny comprehensive pay carb,,
- cheaper no to claim before claim compagny insurance accepted to pay damage,, spreading the cost time may expenditures,, when the premium rise average premium increase ,percentage , penalty.
- certificate ,: of insured understanding the limitations imposed buy car,
Wath car are covered ..policy holder hire agreement,contract not less, certificate deos usually the vei registry number insuy car log book same person licensed invalid , re-register car personalite,
- cover for other vehicles , driver motor belonging apply policy old.. personel use business extend cover carrying passenger examples domesy and same definition, limitations as use ,police person connection business Hering commercial ,, open policy ,person class policy driving order permission,
- restricted policy person entitled ,open policy certificate misleading check policy state ,policy exclusive..
- checking your certificate ,new policy cover arrange paise make any policy endori insured expect ..
- the policy number, description of vehicle cover an open certificate vehicle registration make rigth ,name policyholder name rester own car log book , date commences and expire date different form .,
- the person entitled to drive remember that certificate state endorsed policy can ..safe safety

Policy : warrenty maintenace appliances electric , 6 month , installation.guatd appliance fault find surgery application ,recovery . manufacture electrical rejected test warenty inspection installation domestic industrial compare result appliance and application police vs .. indemnity insurance house hold ,

- policy telecommunication ,
indicator package match map. Voice gateway
, control traffic vocal coming source classified ,traffy arrive interface ruling function,research raiter voice ,no disable.
- policy map input - voice :
Class voiy not gateway interface fast ethy 2/3/0 ,
- description downstream voice gateway ,service polici input voice research priority IP on non existent no source vocal ,input in long waiting non call VoIP AARNet, configure.. waintiny away wfq,
- or for detection wired weighted random early detecy setting direct mecanism,
- policy - map out data ATM.
Class class default random detect ..
- policy map output data , Ethernet ,
Class class default .
Use quee next custome next .
- policy map output data VIP ethernet class default random detect.
-police map output data serial class ,
Class default .
- policy map output data VIP serial,
Class class detect , cards of strategic input standing waiting door ethernet vio versality interface processor , interface ,
Interface ATM o / on,service policy output , data - VIP - ATM ,, interface 3/0/0 ,
- service VIP ethernet interface serial 5/0/0 service , service - policy output data VIP serial ..policy parameter PVC ,speed function interface ,map , similarly
- policy map out voice ,VIP ATM ,class voice , priority 816 ,class default, random detect .
Policy map output voice VIP ,ATM 60 ,class voice , priority 1632, class class defy,random detect,
- policy map output voice ,ATM 40 Priory 816 class default random detect ,,policy output voice ATM ,class voice priority 1632class class default, random detect, policy map output voice ethernet,class voice priority class class default..policy map output voice ethernet 30 ,class voice priority,class class default random,policy output voice class voice priority 768 ,class class default,
- cards strategies vocal interface ATM / o ,service policy output output voice ATM 39 , interface etherfacr ,service policy output output voice ,
- interft ethernet 3/0 , service policy output output.voip network confidential lost control difficulties numby of terminal ,
- proxy h 323, control, rate limited commited access customer have bandwidth, survey traffic in out traffic priority IP if qualify traffic,rate limited input access group 200240000000 conform action set prec transmission,access lost 2.. networks VoIP , connection relay fram forum frf
.- attack coming car protect network limited 160 kbiys /s.
- passerelles h ,,rtpc passerelles ,rtpc in VoIP ,PABX passerel PABX .
- accountability delivery : authentical accountability authority radius .
- security of passerelles, protection of passerel attaque Deni service fraud
Precauy majority...
Engineering planing numeratation , existing to type of terminal in dial peer VoIP show.
- dial peer voice VoIP .
- destination pattern 7 , sessions targets IP 4xxxc,dial peer voice ,VoIP destination patternence , session target,
Harp standby router protocol, connect vlan telephone PC inter switch link ..
+ Descristion part member of voice vlan .
Connect vlan.
Switch part priority 5 , switch port access vlan.
Interface fasterherner ,descry part member of data vlan ,switch priority .
.router ,traffic high liability reason non correspondance of speed report 200,m ,,hierarchies of traffic vocal utilisation..class, class Mao voice ,match access group name IP ,policy map RTP voice class voice ,priority 200000, interface ATM point descriptions, service policy output RTP voice ,in access list extended ipndeny up any fragments, permit UDP any ragrvvpresedentv.
-bandwith allowed to be n 24 bit or n is number call simultaneously..
- passerelles.compuse quantity , quantity canal ,,
- plan of number base posted..
- plan of number base number ..

17.policy , appliance electric house home design
cooling thermocontrol Peltier
..DC vs pumper supply type, recommended of manufacture,, coefficient of performance, Performance vs current .
Optimal operating , warning cold,object Peltier elements,heat ambient..
- heat pumped vs current. , DC vs .tech controller..code operationel.. logiciel,control
- comparison of two Tex controller. Remarkable time more power need to than six more ,, enclosed in cases.
- lineare vs amps tech controller.delivere current..
TEC controller driver direct .
Systeme desit controller heating TEC controls,TEC single dual ..
Design process,estimate loads,define temperature, choosing heath fab temperature sensor,power supply requirements,test your , ,,.
Heat rejected vs current ..
Performance vs current ..
Heat pumped vs current..hear sirikin .
-Policy engineering..policy safety management, accident prevention ,fire protection risk control project management financial management,mine health and safety act amanded health safety mine section , health and safety representative section tripartite inspector of mine health and safety section power minister legal proceedings b, provision, electric initiation shoot explore based ,safety application part electric detonator explore ,GAZ measure equipment primarily par use in mine , battery operated portable flammable gas, measuring instruments,design Mandai code practice occupation , design erection use and inspectors access scaft ,conditions system ,safe use operational ,inspection belt conveyor in mine , homologation respiry equipment,vantilation brattrie on ducting,ignition engine system and machine ,hazard ,GAZ measuring equipment primarily for use mine conservation, conditions assessment of steel wire rope on mine rope safety on mine .
- trade of secury guard general duty apprenticeship,designation trade and non designated trade code ,duration basic training block ,colpower norm 2,kW ,space norm,2kw ,space norm 2000 sa,entry . minimum.
-course structure praci training components of training basic training block , practical block , principal control panel,500H, ,fire safety eny,defense security , paramilitary ,tools . machinery required.
Week , professional skill , professional knowledge,safety workshop ,importance safety workshop, families.importance trade ,mean definition important, mean involve, secut concept resposable officer duty threat,roles security,private security role resposable socii , low act explosii agency proviulow o
-topic ,topic language literacy ,pronauciation function , reading, writing,speak,
- it literacy basic PC ,PC system ,word processing ,workshop computer networking,
- communication skill , introduction communication skill listen skill,motivay,facing intervy,behaviy, problem skill problem solvoy confii , --entrepreneurs skill ,concept project , investment, procurement.
Health safety environment say health occupation hazard accidy safety basic provision,ecosy.energy conservation, ground enviy.
- quality tools, quality conscious,quality management system is 9000 bis system housekey.practicd of good ,quality tools ,basic .
- broad skill componyto covered during job .
- shop floor training.doc insure dress book training, equipment use first training safety of electrical mains evaluation plan secuy check point ,
- demonstrate hhmd, hand held metal detector,door held metal detector DFM,first aid,fire figthing equipment, organisation flammable lit, maintenace of tools and equipment, practical ,role play security , communication verbal ,used equipment screen .
- pracy incidence briefing reparty practice commuy on walk tools,crown management.
- safety and security equipment, malfy and likely cause ,search door frame scanner ,x rat baggage inspectiy explosion vapor trace ..
- final assessment .
Subject : block professional skills, professional kny, employment skii,
- mark,/ internal assessment based on competency ,full mark, pass mars,dure .
Name of the equipment.pc system PC table,PC chain white,l.c.d projector,ups 650 Va offline ,detector smoke fire hand held wireless communication portable ,barricade cordoning flash ligth ,bionoculor,night vision ,first whist ,CCTV signage board,minor search veihci,fire fighter equipment..
-home security : floor light b,door and windy safe burglar alarm escape ,,
Barrier against break lichain link fence line low cost security for house and garden ,corrective surgery vulnerable Dior ways barring the door the basic lock and bolt ,putting on better

to TSHINGOMBEKB, me,
tshingombe

Policy : division suply chain management.
Graduation recruitment .humaine resource .police service motor : mechanic national n3:,n2: performance qualifications . Cost effective repair and maintenance ,police attandance vehicle ,ensure a clean and safe environment diagnostic strip ,and determine the part require, plumbing, electrician inter ,trade matric n3: performance maintenace active on projects obtaine material for installation usage and safeguarding of all equipment, material on cleanit , working environment ,apply,, carpenter ,n 3 read interpret request set up use various hand tools set up and operate , mortise,moykder shapper ..
- electrical engineering , architecture administration ,inter procurement contract ,
Management ,purchasing logistics, facility all special meeting by preparing of documents and ananding and approving existing..

-technology ,safety engineering molt STD accreditation network
- security industry authority , securite b,general fire safety outdoor events steward duty..access .
Provision access fire appliances 45-59 metre of structural , required 4, metre overhead clearence of four metre surface, vehicle travel, electricity and gas safety attention draw to health safety guidelines ,electrical safety in place of entrainment,advice of liquefied, petroleum .log for cooki
Crown are premise free for hazard event ground and floor surface trip hazard fenced off,attractor , activities structure completed staffed,are structure ,stature ways platform equipment ,barrier fencing securier ,entrance existing are adequate entrance ,crow control,isr control room operator communication and pa system work system ,are required.
- electrics , installation certificate cabling equipment secure protection clear public circular area..
Ligthning: is normK and provided in working order and lit when working order ,medical facilities..are there trainer first on site is suitable.
- fire precautions: is fire fii equipment in place , rubbish and combustible.material stored away from structure fire exit.
Toilet accommodation.is clearly ..
- risk ast; event date of event venue .sheet.
Hazard identify,person at risk , risk factors medium , measure required to control , action to taken ,action to be taken by name ,date completed..
- policy engineering
design elements , alarm control design report.
Access control point ,turnistall parking gate ,elevator physical barrier,vector stencil library alarm access control , systt of digital , proximity equipment, locking hard and ,access control about
- Probly or conditi alarm dey are out fitted siren ,device , typical ,the access point there is stand alone electric lock ,unlocked,by an operator with a switch ,to automate , intervention,replaced reader could, card,key pad ,code entered a biometric reader radar ,do not usually make an access list to monitor the door , position a magnetic door switch can used , switch link car door ,
control ,yes ,generally only entry is controlled and existing , controller , a second reader issue in the opposite side case where exiy not crot free existing advu ,called ,request to exist rex ,is used request to - existing is not can push button or a motion detection, when button is pushed,yes door is opened, existing b,door having electrical locked door , mechanical, .. magnetic unlock dear alarm ,fire alarm control ,
- physical security plan , install solution symbol sgap vector ..
CCTV system plan video surveillance diagt created in concept using video library access plan solutions experience step 29 minutes creating ,smoke alarm plan was created Oro using security and access plan solutions ..
- emergence plan . Flow chart software diagram mind marker network bdiagrame wire famewt project manager data flow duat, graphic bconcept , scientific illustray flowchartsymbol,
- fire sure , engineering fire safety solut. Home training fire, fire extinguisher, fire warden training,fire awareness , maintence,dry risser testing,fire hydrant testing ,foim intekb,fire extinguisher ,service : fire assessment,fire door inspection,fire escape planning, fire Espace,
.- portable fire extinguisher, automatic fire super ,fire hose ree ,fire evai,fire dootfurnitur,fire incly simple,all emergency exit vertical v,the point of locatt of the user you ,the location.

t

S

Dashboard

keyboard_arrow_right

Google Wallet API
Issuer ID: 3388000000022260070

info

More about Google Wallet API

You're in demo mode

In demo mode you can create and test passes before they go live. When you’re ready to publish a pass, request publishing access. Learn more

Get publishing access

0/3 completed, 0%

0/3 completed

create

Create a class

You must create a class in demo mode to request publishing access.

business_center

Complete your business profile

You must have an approved business profile to request publishing access.

fact_checked

Request publishing access

Create a class

A class is a template for your passes. Create your first class, to start publishing passes.

cloud

Register for access to the REST API

Create a Developer user account using your Service Account Email address.

DashboardBusiness Profile*code*Google Pay API*code*Google Wallet APIUsers

Help Center

Contact support

Send feedback

Google Pay & Wallet Console

Additional Terms of ServicePrivacyBusiness Policies

Dashboard

keyboard_arrow_right

Business Profile

info

More about Business Profile

article

Your business profile is under review. If this status has not changed after one day, please contact support.

Business identity

Select or create a payments profile to identify your business across Google. Learn more

Business information

Logo

info

Help your customers recognize your business on Google. For businesses with basic information, the Business Profile will highlight the logo.

Min resolution: 640 x 640 px. Max resolution: 1024 x 1024 px. Max size: 5MB. To see where Google may display this logo, please refer to the Google Pay & Wallet Console Additional Terms of Service.

Basics

Public business name

tshingombe tshitadi

Merchant Category Code (MCC)

Miscellaneous Apparel and Accessory Shops (5699)

Business phone (optional)

+27 72 529 8946

Customer support

Corporate website

https://wwwtshingombe.com

Customer support URL

https://wwwtshingombe.com

Customer support email

tshingombefiston@gmail.com

Customer support phone

+27 72 529 8946

loading

loading

loading

loading

no subject)

Inbox

Google Wallet Support Team <google-wallet-passes-support@google.com>

12:26 PM (4 minutes ago)

to
me

Thank you for contacting the Google Wallet API support team. We will get back to you within 1 business day.

Our operational hours are:
Monday - Friday
8:00 AM - 5:00 PM PT

Best regards,

The Google Wallet API Support Team

Re: Account Confirmation for Google Play Academy Certificates

Inbox

TSHINGOMBEKB TSHITADI Fri, Jul 28, 9:51 PM

to donotreply, me, tshingombetshitadi, tshitaditshingombe

On Fri, 28 Jul 2023, 21:29 , <donotreply@webassessor.com> wrote:

Hello Fiston Tshingombe,

Welcome! You have been set up with an account in the Webassessor exam delivery system. You will be able to register and take GooglePlay certifications using this system.

Access the related training and more at https://play.google.com/academy/certificate

Your login is: tshingombekb@gmail.com

Please follow these steps to register your exam(s):

7. Log in to access Webassessor: https://www.webassessor.com/GOOGLEPLAY
8. Then click the "Register for an Exam" tab.
9. Select the available exam for "Google Play Store Optimization", and click "Get Now".
10. Review the exam details, and click "Check Out".
11. Then click the "My Assessments" tab.
12. Click the "Launch" button to the right of the exam name to start.

To reset your password in the future, please click the link below, enter your login (provided above) and click "Submit". You will receive an email with a link to update your password.
https://www.webassessor.com/wa.do?page=forgotPassword&branding=GOOGLEPLAY

Once you have set your password, use the following link to access Webassessor:
https://www.webassessor.com/GOOGLEPLAY

Please do not reply to this e-mail as it is automatically generated from our exam delivery system.
If you have questions, please contact GooglePlay at play-certificate-support@google.com.

Thanks
The Google Play Academy Team

Re: fiston tshingombe invited you to the Google Pay & Wallet Console

Skip to content

You have **8 days** left in your trial, which includes all featuresChoose a plan to buy

1. Dashboard
2.

5.

1.

7.

Current pageOpens in new window

Tshingombe

Your last login:
from South Africa

Get visibility over your cash flow

Track where your money is going

Invoices owed to you

New sales invoice

Summary table left	Summary table right
11 Draft invoices	26,518,129,521.15
20 Awaiting payment	9,129,789,627.15
15 Overdue	12,002,289,085.70

Older6-12 AugThis week20-26 Aug27 Aug-2 SepFuture
Next:
Import unpaid invoices to track what’s due
See overdue and upcoming invoices at a glance on the dashboard. Learn how to import invoices
Import unpaid invoices

Bills you need to pay

New bill

Summary table left	Summary table right
3 Draft bills	1,490,514.75
7 Awaiting payment	799,815.72
4 Overdue	1,674,167.77

Older6-12 AugThis week20-26 Aug27 Aug-2 SepFuture
Next:
Import unpaid bills to track what’s due
Get an accurate view of how much you owe and when payments are due. Learn how to import bills
Import unpaid bills

Stay on top of your taxes

Reimburse your employees

Record, approve and track expense claims from employees
Set up expense claims

Explore apps that connect with Xero

1. Reports

Account Summary

Account (required)

Date range: Year to date
1 Jan 2023
13 Aug 202
Budget
None

Select account and update report to get started

Accounts

Date range: This month
1 Aug 2023
31 Aug 202

Columns
Grouping/Summarising
Accounts to include
You have **8 days** left in your trial, which includes all featuresChoose a plan to buy

1. Dashboard
2.

5. □ □ □ □ □ □

1.

□ □ □ □ ☐

7. □ □ □ □ □ □

Current pageOpens in new window

1. Reports

Aged Payables Detail

-

□ □ Xero standard report
□ Aged Payables Detail
□ □ Related reports
□ Aged Payables Summary
□ Payable Invoice Summary - Approved and paid
□ Supplier Bill Activity
□ □ Learn more
□ Learn how to create a custom report
Date: End of this month
31 Aug 202
Ageing Periods
Ageing By
Columns
Grouping/Summarising
Aged Payab
Tshingombe
As at 31 August 2023
Ageing by due date

fiston tshingombe																
30 Jul 2023	30 Jul 2023	520	-	(50,000.00)	-	-	-	(50,000.00)								
30 Jul 2023	30 Jul 2023		-	(50,000.00)	-	-	-	(50,000.00)								
Total fiston tshingombe			-	(100,000.00)	-	-	-	(100,000.00)								
mmsale@shoprite.co.za																

3 Aug 2023	8 Aug 2023	2089	651,034.10	-	-	-	-	651,034.10								
3 Aug 2023	3 Aug 2023	2089	651,034.10	-	-	-	-	651,034.10								
Total mmsale@shoprite.co.za			1,302,068.20	-	-	-	-	1,302,068.20								
Tshingombe																
25 Jul 2023	30 Jul 2023	Tshingombe	-	284,149.57	-	-	-	284,149.57								
Total Tshingombe			-	284,149.57	-	-	-	284,149.57								
tshingombekb@gmail.com																
30 Jul 2023	4 Aug 2023	250	87,950.00	-	-	-	-	87,950.00								
3 Aug 2023	3 Aug 2023	2000	(774,352.05)	-	-	-	-	(774,352.05)								
Total tshingombekb@gmail.com			(686,402.05)	-	-	-	-	(686,402.05)								
Total			615,666.15	184,149.57	-	-	-	799,815.72								
Percentage of total			76.98%	23.02%	-	-	-	100.00%								

☑

Compact view
Showing items 1-17 of 17
You have **8 days** left in your trial, which includes all featuresChoose a plan to buy

1. Dashboard
2.

5. □ □ □ □ □ □

1.

□ □ □ □ ☐

7. □ □ □ □ □ □

Current pageOpens in new window

1. Reports

Aged Payables Summary

-

□ □ Xero standard report
□ Aged Payables Summary
□ □ Related reports
□ Aged Payables Detail
□ Payable Invoice Summary - Approved and paid
□ Supplier Bill Activity
□ □ Learn more
□ Learn how to create a custom report
Date: End of this month

31 Aug 202

Ageing Periods
Ageing By
Columns
Grouping/Summarising

Aged Payab

Tshingombe
As at 31 August 2023
Ageing by due date

Aged Payables												
fiston tshingombe	-	(100,000.00)	-	-	-	(100,000.00)						
mmsale@shoprite.co.za	1,302,068.20	-	-	-	-	1,302,068.20						
Tshingombe	-	284,149.57	-	-	-	284,149.57						
tshingombekb@gmail.com	87,950.00	-	-	-	-	87,950.00						
tshingombekb@gmail.com	(774,352.05)	-	-	-	-	(774,352.05)						
Total Aged Payables	615,666.15	184,149.57	-	-	-	799,815.72						
Total	615,666.15	184,149.57	-	-	-	799,815.72						
Percentage of total	76.98%	23.02%	-	-	-	100.00%						

☑

Compact view
Showing items 1-9 of 9
You have **8 days** left in your trial, which includes all featuresChoose a plan to buy

1. Dashboard
2.

5. □ □ □ □ □ □

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□ □ □ □ ☐

7. □ □ □ □ □ □

Current pageOpens in new window

1. Reports

Aged Receivables Detail

-

  Xero standard report
 Aged Receivables Detail
  Related reports
 Aged Receivables Summary
 Receivable Invoice Summary - Approved, sent and paid
 Customer Invoice Activity
  Learn more
 Learn how to create a custom report
Date: End of this month

31 Aug 202

Ageing Periods
Ageing By
Columns
Grouping/Summarising

Aged Recei

Tshingombe
As at 31 August 2023
Ageing by due date

mmsale@shoprite.co.za																				
26 Jul 2023	26 Jul 2023	INV-0001	520	-	-	2,300.00	-	-	-	2,300.00										
27 Jul 2023	27 Jul 2023	INV-0005	QU-0001	-	-	20,000.00	-	-	-	20,000.00										
29 Jul 2023	29 Jul 2023	INV-0008	2000	-	-	340,000,000.00	-	-	-	340,000,000.00										
30 Jul 2023	4 Aug 20	INV-001	5000	-	6,054,596.00	-	-	-	-	6,054,596.00										

	23	2																		
30 Jul 2023	3 Aug 2023	INV-0013	3500	-	2,223.00	-	-	-	-	2,223.00										
31 Jul 2023	4 Aug 2023	INV-0014	2000	-	6,826,877,014.80	-	-	-	-	6,826,877,014.80										
1 Aug 2023	4 Aug 2023	INV-0017	400	-	495,785,952.30	-	-	-	-	495,785,952.30										
1 Aug 2023	9 Aug 2023	INV-0018	200	-	4,217,298,024.85	-	-	-	-	4,217,298,024.85										
1 Aug 2023	1 Aug 2023	CN-0019	200	-	(4,217,298,024.85)	-	-	-	-	(4,217,298,024.85)										
3 Aug 2023	3 Aug 2023	INV-0023	2500	-	1,360,532.80	-	-	-	-	1,360,532.80										
5 Aug 2023	10 Aug 2023	INV-0029	58900	-	8,119,133.40	-	-	-	-	8,119,133.40										
5 Aug 2023	5 A	IN	,256	-	10,125,676.40	-	-	-	-	10,125,676.40										

	ug 2023	V-0026	9																	
6 Aug 2023	12 Aug 2023	INV-0033	25880	-	115,103.50	-	-	-	-	115,103.50										
6 Aug 2023	6 Aug 2023	INV-0031	2500	-	26,268,387.40	-	-	-	-	26,268,387.40										
7 Aug 2023	8 Aug 2023	INV-0036		-	2,530,983.25	-	-	-	-	2,530,983.25										
7 Aug 2023	9 Sep 2023	INV-0035	5269	50,192,329.20	-	-	-	-	-	50,192,329.20										
9 Aug 2023	10 Sep 2023	INV-0041	25600	1,206,477,144.00	-	-	-	-	-	1,206,477,144.00										
10 Aug 2023	12 Sep 2023	INV-0043	63369	66,774,901.80	-	-	-	-	-	66,774,901.80										
11 Aug 2023	11 Aug 20	INV-0047	54799	-	67,729,158.00	-	-	-	-	67,729,158.00										

	23																			
11 Aug 2023	29 Sep 2023	INV-0045	500	21,354,191.30	-	-	-	-	-	21,354,191.30										
Total mmsale@shoprite.co.za				1,344,798,566.30	7,444,968,760.85	340,022,300.00	-	-	-	9,129,789,627.15										
Total				1,344,798,566.30	7,444,968,760.85	340,022,300.00	-	-	-	9,129,789,627.15										
Percentage of total				14.73%	81.55%	3.72%	-	-	-	100.00%										

☑

Compact view
Showing items 1-24 of 24
Skip to content

You have **8 days** left in your trial, which includes all featuresChoose a plan to buy

1. Dashboard
2.

5. □ □ □ □ □ □

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Current pageOpens in new window

Business snapshot

Tshingombe

For the period 1 Jan 2023 - 13 Aug 2023 ● Accrual basis

Profitability

1 Jan – 13 Aug 2023

1 Jan – 13 Aug 2022

Profit or loss

7,599,495,966

No data from previous period

Jan – Aug 2023Jan – Aug 20227.60e+3M0

Profit is the amount of money made after paying expenses

Income
1,270,033,326

No data from previous period

JanMarMayJul-5900.2M-2314.6M1271M

Expenses
-6,329,462,640

No data from previous period

JanMarMayJul-5900.2M-2314.6M1271M

Cost of goods sold: **0**

Operating expenses: **-6,329,462,640**

Efficiency

Net profit margin
598%

No data from previous period

JanMarMayJul0%70%140%

For every R 1 of sales revenue, an average net profit of R 5.98 is made

Gross profit margin
100%

No data from previous period

Gross profit

Sales revenue: **1,270,033,326**

For every R 1 of sales revenue, an average gross profit of R 1.00 is made

Largest operating expenses	1 Jan – 13 Aug 2023	1 Jan – 13 Aug 2022
Bank Fees	165,236	0
Interest Expense	20,000	

0

Unrealised Currency Gains	18,914

0

Depreciation	0

0

Entertainment	0

0

Financial position and cash

On 13 Aug 2023

Balance sheet

Assets: **9,095,690,296**

Liabilities: **1,494,094,341**

Equity: **7,601,595,955**

AssetsEquityLiabilities

Assets are equal to liabilities plus equity

Average time to get paid

809 days

Value of unpaid invoices:**9,129,789,627**

Average time to pay suppliers

-

Value of unpaid bills:**799,816**

☐

Show financial ratios

0%

Skip to content

You have **8 days** left in your trial, which includes all featuresChoose a plan to buy

1. Dashboard
2.

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Current pageOpens in new window
Analytics

Short-term cash flow projection

View your future bank balance based on invoices and bills

Bank accounts included
To select an account and see your future bank balance, add a bank account
Projection time frame

You have **8 days** left in your trial, which includes all featuresChoose a plan to buy

1. Dashboard
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Current pageOpens in new window

1. Reports

Balance Sheet

-

□ □ Xero standard report
□ Balance Sheet
□ □ Common formats
□ Monthly comparison
□ Quarterly comparison
□ Yearly comparison
□ □ Learn more
□ Learn how to create a custom report
Date: End of last financial year
31 Dec 202
Compare with
Currency

Balance She

Tshingombe
As at 31 December 2022

Net
Asset -
s

☑

Compact view

1.

Bank Reconciliation

Contents

Pack date range: Month to date
1 Aug 2023
13 Aug 202
Bank Account (required)

Bank statement ending balance

1. Reports

Bank Summary

Date range: This month
1 Aug 2023
31 Aug 202
Columns
Grouping/Summarising
Bank Summ
Tshingombe
For the period 1 August 2023 to 31 August 2023

1. Reports

Billable Expenses - Outstanding

Date: Today
13 Aug 202
Columns
Grouping/Summarising
Billable Expe
Tshingombe
As at 13 August 2023
Nothing to show here

1.

Untitled Report

Date range: Last financial year
1 Jan 2022
31 Dec 2022
Untitled Rep
Tshingombe
For the year ended 31 December 2022

Create a report using the layout editor
☑

Compact view

Budget Manager

Select Budget

Start
Jan 2023
Actuals
3 months
Period
12 months
Update

Overall Budget

0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0

0	0	0	0	0	0
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0	0	0	0	0	0

Import
Export

-
-
-

SaveCancel

Reports ›

Overall Budget

Budget:

_
From:

July 2023

Period:
1 month

Number of periods to show:
12 Periods

Update

Overall Budget
Budget Summary
Tshingombe
July 2023 to June 2024

Account	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	May-24	Jun-24
Gross Profit	0	0	0	0	0	0	0	0	0	0	0	0
Total Expenses	0	0	0	0	0	0	0	0	0	0	0	0
Net Profit	0	0	0	0	0	0	0	0	0	0	0	0

You have **8 days** left in your trial, which includes all featuresChoose a plan to buy

1. Dashboard
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Current pageOpens in new window

1. Reports
2.

3. Custom

Budget Variance

-

□ □ Xero standard report
□ Budget Variance
□ □ Recently updated custom reports
□ Budget Variance engineering
□ Budget Variance
□ □ Common formats
□ Current and previous 3 months

- Current financial year by month
- Current financial year by month – actual and budget
- Month to date comparison
- Year to date comparison
- Learn more
- Learn how to create a custom report

Date range: This month

1 Aug 2023

31 Aug 202

Budget

Overall Budg

Currency

Budget Vari

Tshingombe
For the month ended 31 August 2023

Trading Income

Interest Income	(10,000.00)	-	(10,000.00)
	- (10,000.00) -	-	(10,000.00)
Other Revenue	1,270,033,326.00	-	1,270,033,326.00
	- 1,270,033,326.00 -	-	1,270,033,326.00
Sales	10,000.00	-	10,000.00
	- 10,000.00 -	-	10,000.00

Total Trading Income	1,270,033,326.00	-	1,270,033,326.00	-	1,270,033,326.00	-	1,270,033,326.00	-
Gross Profit	1,270,033,326.00	-	1,270,033,326.00	-	1,270,033,326.00	-	1,270,033,326.00	-
Operating Expenses								
Advertising	(209,898,765.00)	-	(209,898,765.00)					

	- (209,898,765.00) -	-	(209,898,765.00)

Bank Fees	-	-	-
	-		
	165,236.05	-	165,236.05
	-		
Cleaning	(209,989.00)	-	(209,989.00)
	-		
	(209,989.00)	-	(209,989.00)
	-		
Consulting & Accounting	(214,435,458.00)	-	(214,435,458.00)
	-		
	(3,667,844,225.00)	-	(3,667,844,225.00)
	-		
Freight & Courier	-	-	-
	-		
	(2,000,980,000.00)	-	(2,000,980,000.00)
	-		
Insurance	(445,598.00)	-	(445,598.00)
	-		
	(445,598.00)	-	(445,598.00)
	-		
Interest Expense	20,000.00	-	20,000.00
	-		
	20,000.00	-	20,000.00
	-		
Light, Power, Heating	(200,989.00)	-	(200,989.00)
	-		
	(236,988,668.00)	-	(236,988,668.00)
	-		
Motor Vehicle Expenses	-	-	-
	-		
	(209,200,547.00)	-	(209,200,547.00)
	-		
Office Expenses	(2,000,000.00)	-	(2,000,000.00)

-
[(2,000,000.00)] - (2,000,000.00)
-

Telephone & Internet	[(2,098,998.00)]	-		(2,098,998.00)
	- [(2,098,998.00)] -	-		(2,098,998.00)
Unrealised Currency Gains	[16,063.60]	-		16,063.60
	- [18,913.53] -	-		18,913.53

Total Operating Expenses	(429,253,733.40)	-	(429,253,733.40)	-	(6,329,462,640.42)	-	(6,329,462,640.42)	-
Net Profit	1,699,287,059.40	-	1,699,287,059.40	-	7,599,495,966.42	-	7,599,495,966.42	-

☑

Compact view

Financial ratios are now available in Business snapshot

- See your core financial ratios alongside your other financial health metrics
- View your ratios over a number of different date ranges
- Print your financial ratios

1.

Cash Summary

-

  Xero standard report
 Cash Summary
  Common formats
 Working capital with other cash movements
  Related reports
 Bank Summary
  Learn more
 Learn how to create a custom report
Date range: This month
1 Aug 2023
31 Aug 202
Compare with
Cash Summ
Tshingombe
For the month ended 31 August 2023

Surplus (Deficit)	-	-	-
Plus Tax Movements			
Tax Collected	64,211,236.80	8,026,404.60	700.00%
Tax Paid	(64,211,236.80)	(8,026,404.60)	-700.00%
Net Tax Movements	-	-	-
Net Cash Movement	-	-	-
Summary			
Opening Balance	-	-	-
Cash Balance	-	-	-

1. Reports

Cash Validation

Accounts (required)

Date: Today

13 Aug 202

Columns

Grouping/Summarising

1. Reports

Contact Transactions - Summary

Contact (required)

Date range: This month

1 Aug 2023

31 Aug 202

1.

Depreciation Schedule

Date range: Last month

1 Jul 2023

31 Jul 2023

Columns

Grouping/Summarising

☐ Depreciation
Tshingombe
For the month ended 31 July 2023
Nothing to show here

Reports ›

VAT Report

Preparing your VAT201 report?

Our new VAT201 report calculates VAT for you. It also meets your South African Revenue Service (SARS) obligations and automatically includes late claims.

Learn more about VAT201 reports in Xero

- VAT Summary
- VAT Audit Report

From:

☐

To:

☐

☐

Show by Tax Rate

☑

Show by Tax Component

☐

Show by Account Type

Update

VAT Summary
Tshingombe
For the period 1 July 2023 to 31 July 2023

Tax ID Number	Not found. Enter	
VAT Basis	Not set. Set tax basis	
VAT Period covered		1 Monthly
From	1 Jul 2023	
To	31 Jul 2023	

You have **8 days** left in your trial, which includes all featuresChoose a plan to buy

1. Dashboard
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Current pageOpens in new window
Fixed assets
Hide Help

Track business assets to manage their depreciation and disposals
Import your existing asset registry to Xero via CSV or manually add assets
See our step-by-step guide to setting up fixed assets
Last depreciation: none
2 items

☐

You have **8 days** left in your trial, which includes all featuresChoose a plan to buy

1. Dashboard
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Current pageOpens in new window
Fixed assets
Hide Help

Track business assets to manage their depreciation and disposals
Import your existing asset registry to Xero via CSV or manually add assets
See our step-by-step guide to setting up fixed assets
Last depreciation: none
2 items

☐

▯ Reports

1. ▯ Custom

Statement of Cash Flows

Date range: This month
1 Aug 2023
31 Aug 2023

Compare with

Statement o

Tshingombe
For the month ended 31 August 2023

Investing Activities	
Proceeds from sale of property, plant and equipment	4,690.00
Payment for property, plant and equipment	(4,690.00)
Net Cash Flows from Investing Activities	-
Net Cash Flows	-
Cash and Cash Equivalents	
Cash and cash equivalents at beginning of period	-
Cash and cash equivalents at end of period	-

☑

Compact view You have **8 days** left in your trial, which includes all featuresChoose a plan to buy

1. Dashboard
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Current pageOpens in new window

Reports ›

Sales by Item

This report contains details of untracked inventory items

For reporting on both tracked and untracked Inventory items head over to the new inventory reports

From:

To:

Sort by:

ItemCode

☑

Show in ZAR

Update

Sales by Item
Tshingombe
1 August 2023 to 31 August 2023

Item	Current Unit Price	Quantity Sold	Total	Average Price
0 - Fiscal fraude,Min,max value , energie tax , engine	25,000.00	1.0	25,000.00	25,000.00
000123 - Engineering chemistry, engineering physics, metall	2,000,000.00	3.0	6,000,000.00	2,000,000.00
00112345 - Instruct,health clean biotech ,food,vacum tend low	50,098.00	2.0	100,196.00	50,098.00
00112345098 - Instruct,inspect food take typical info,compos low	50,000.00	2.0	100,000.00	50,000.00
001123456 - Instruct,buotechno machine food cook,agro value	500,989.00	2.0	1,001,978.00	500,989.00
0011236398 - Instruct, biotechnology, food beverages, composite	50,000.00	2.0	100,000.00	50,000.00
001123984 - Instruct,typic food nutrie ph ,basic,acid 7, GRA v	500,989.00	2.0	1,001,978.00	500,989.00
001126867 - Instruct,food medecinal value assessment low,	5,009,898.00	2.0	10,019,796.00	5,009,898.00
00113456 - Instruct,biomicrobiologi,scanner biochem,low	50,009.00	2.0	100,018.00	50,009.00
001134567 - Instruct,agro pastoral tools equipment,low	50,000.00	1.0	50,000.00	50,000.00
00114356 - Instruct ,policy safe biotechnology skill dev,Lo	500,098.00	2.0	1,000,196.00	500,098.00
00122357 - Instruct,food value Assessment Portofilio low,osha	500,098.00	2.0	1,000,196.00	500,098.00
001334 - Engineering plastic ,metallurgie, geotechnical	2,345.00	5.0	11,725.00	2,345.00
0022345 - Instruct ,bio food manufac package assembly mec	5,090,098.00	1.0	5,090,098.00	5,090,098.00
002345 - Engineering, construction civil,mecanic,const elec	345,654.00	3.0	1,036,962.00	345,654.00
00526 - Instruct ,visa electrical ,meter energy, permit	25,000.00	1.0	25,000.00	25,000.00
00652 - Instruct,visa ,markdept , license fiscal,license	258,369.00	1.0	258,369.00	258,369.00
007200 - Instruct commission, council,visa passport id	25,000.00	1.0	25,000.00	25,000.00
0072096 - Instruc, bulletin,visa certificate,metering city	2,500.00	1.0	2,500.00	2,500.00
007236 - Instruct,com, I'd visa ,wegh,scale,size, plate sup	52,669.00	1.0	52,669.00	52,669.00
0072536 - Instruct com,plate fiscal,plate , empower,value	639,980.00	1.0	639,980.00	639,980.00
007255 - Instruct, commission,Eng visa passport,I'd supplie	200,690.00	1.0	200,690.00	200,690.00
00725669 - Instruc commis, municipality,visa engine supply	2,506,690.00	1.0	2,506,690.00	2,506,690.00
0072569 - Instruct, commission composit,visa I'd , supply	2,536,609.00	1.0	2,536,609.00	2,536,609.00
0072693 - Instruct,com,visa city meter ,plate , fiscality	528,809.00	1.0	528,809.00	528,809.00
0072698 - Instruct com, visa wehit plate number, fiscality	258,800.00	1.0	258,800.00	258,800.00
0092086 - Instruct info manage system , commissair, rulings	2,500.00	1.0	2,500.00	2,500.00
0092096 - Instruct, database drawing cad , commissair	2,589,658.00	1.0	2,589,658.00	2,589,658.00

00920996 - Instruct, office travelling , commissair rulings c	52,000.00	1.0	52,000.00	52,000.00
009258886 - Instruct , database intelligence robot, system	582,669.00	1.0	582,669.00	582,669.00
0092609 - Instruct, performance,info database code ,	56,800.00	1.0	56,800.00	56,800.00
0092639 - Instruct, data cc+, computer sale cash ,note	258,996.00	1.0	258,996.00	258,996.00
0092653 - Instruct, code database visuel basic, commissair	258,639.00	1.0	258,639.00	258,639.00
0092658 - Instruct,code database image	536,989.00	1.0	536,989.00	536,989.00
0092663 - Instruct,adm skill communication, commissair mark	2,699,389.00	1.0	2,699,389.00	2,699,389.00
009269 - Instruct, info data base logic control	25,899.00	1.0	25,899.00	25,899.00
00926959 - Instruct, database Unix web mail office	2,589,636.00	1.0	2,589,636.00	2,589,636.00
0092696 - Instruct, database treatment text table creat ,	2,580,996.00	1.0	2,580,996.00	2,580,996.00
0092698 - Instruct, database creation ,access key lock commi	256,690.00	1.0	256,690.00	256,690.00
00928663 - Instruct,info data base info , creation file , doc	258,000.00	1.0	258,000.00	258,000.00
0092963 - Instruct,information processing commissair marks	25,000.00	1.0	25,000.00	25,000.00
009563 - Instruct , database operating system , computer	258,009.00	1.0	258,009.00	258,009.00
0096369 - Instruct, technology info ,actual view open .ms	250,069.00	1.0	250,069.00	250,069.00
00963699 - Instruct,database mathematics informatique,	52,006.00	1.0	52,006.00	52,006.00
00989876 - Engineering elect, electrotech ,load EIC,norm symb	200,898.00	4.0	803,592.00	200,898.00
009899 - Engineering, artisan,clot ,logistic, operational m	209,989.00	3.0	629,967.00	209,989.00
0098996 - Instruc,manage business data Audit , inventory	10,000.00	1.0	10,000.00	10,000.00
0099056 - ,instruct ,printer ,scanner wizard database,	258,906.00	1.0	258,906.00	258,906.00
009925 - Instruct , Eng market,libell,barcode thermo, packa	258,000.00	1.0	258,000.00	258,000.00
009926558 - Instruct,databee language machine ,it manufac	536,999.00	1.0	536,999.00	536,999.00
009963 - Instruct database ,trainer circulum,	25,800.00	1.0	25,800.00	25,800.00
0099636 - Instruct, database, creat hard word sofward,	25,996.00	1.0	25,996.00	25,996.00
00996363 - Instruct,order ob ,access book,log book,incid book	50,000,693.00	1.0	50,000,693.00	50,000,693.00
00996363669 - Instruct, exercise book ,journal account engineeri	5,000.00	3.0	15,000.00	5,000.00
009963663 - Instruct,	500,963.00	1.0	500,963.00	500,963.00
0099636632 - 0099636633	996,636,996.00	1.0	996,636,996.00	996,636,996.00
00996366366 - Instruct, low skill devel casebook textbook eng	25,000.00	2.0	50,000.00	25,000.00
0099636639 - Instruct,..	50,063.00	1.0	50,063.00	50,063.00
0099636963 - Instruct, low skill devel safe secure policy , Eng	50,096,996.00	1.0	50,096,996.00	50,096,996.00

00996369669 - Instruct, skill devel casebook Portofilio low eng	56,000.00	2.0	112,000.00	56,000.00
00996369696 - Instruct ,booking record,control cash book, superb	5,000,069.00	1.0	5,000,069.00	5,000,069.00
00996389 - Instruct, database cable port USB,fibre optic,pin	258,909.00	1.0	258,909.00	258,909.00
0099639 - Instruct, database screen VGA ,pixel svga, code	2,580,996.00	1.0	2,580,996.00	2,580,996.00
00996396 - Instruct, database display mouse , module monitor	36,500.00	1.0	36,500.00	36,500.00
009963969 - Instruct,step opera creation syst devel system,	10,000.00	1.0	10,000.00	10,000.00
00996539 - Instruct, makert data ,stamp quintance,cheque note	26,998,399.00	1.0	26,998,399.00	26,998,399.00
0099663663 - Instruct,book record sale cust ,exercise book note	500,063.00	4.0	2,000,252.00	500,063.00
0099680 - Instruct, financial data fiscal Min max binary	10,000.00	1.0	10,000.00	10,000.00
0099685 - Instruct, humain resource,Eng,salary data,fund	30,996.00	1.0	30,996.00	30,996.00
0099698 - Instruct, trainer PC info path office professional	693,369.00	1.0	693,369.00	693,369.00
009969859 - Instruct ,architect PC ,system data ,build circuit	15,699,639.00	1.0	15,699,639.00	15,699,639.00
0099963 - Instruct,court order certificate outc commissair	500,003.00	1.0	500,003.00	500,003.00
0099985663 - Instruct, skill devel casebook exercise book low	52,699.00	1.0	52,699.00	52,699.00
011235543 - Instruct ,health typical info nutriefood	58,000.00	1.0	58,000.00	58,000.00
011236639 - Instruct, biotech genie ,,agro, food composite,low	523,699.00	1.0	523,699.00	523,699.00
01134567 - Instruct,scale mass bio food balance, type measure	5,009,878.00	1.0	5,009,878.00	5,009,878.00
01145678987 - Instruct ,bio microscope,electrolyte fore, food lo	5,000.00	1.0	5,000.00	5,000.00
011567898 - Instruct,safe secure biotechnology skill devel low	50,009.00	1.0	50,009.00	50,009.00
012236963 - Instruct, biotechnology.biogenie, creation	569,999.00	2.0	1,139,998.00	569,999.00
0224574 - Manufacture,control logic , engineering fund,syst	3,450,008,767.00	1.0	3,450,008,767.00	3,450,008,767.00
02346 - Engineering,Elec , electromagnetic,AC,DC load	209,099,878.00	4.0	836,399,512.00	209,099,878.00
0336699963 - Instruct, library bibliotech low ,booking file ord	500,852.00	1.0	500,852.00	500,852.00
052001 - Education technology, and Education engineering	20,000.00	1.0	20,000.00	20,000.00
052003 - Education pedagogy tech, Engineering,	20,000.00	1.0	20,000.00	20,000.00
052008 - Educ , certificate building,hand book,license buil	25,000.00	1.0	25,000.00	25,000.00
052069 - training I struct license ,and policy ,safety prod	25,800.00	1.0	25,800.00	25,800.00
052096 - Education management,quality insurance	258,336.00	1.0	258,336.00	258,336.00
0523 - Instruc issue,license ,certific ,policy frame,	5,236.00	1.0	5,236.00	5,236.00
05236 - Education training, trainer engineering, manufactu	20,000.00	1.0	20,000.00	20,000.00

0523669 - Education,trade educare, manufacture,used	30,000.00	1.0	30,000.00	30,000.00
05263 - Instruc ,indicator defense factor,step,oper,sfet w	5,200.00	1.0	5,200.00	5,200.00
052800 - Instruct ,trainer,composite ,matter,safety , commi	25,900.00	1.0	25,900.00	25,900.00
0529 - Traine instruction book Engineering, manufacture	258,000.00	1.0	258,000.00	258,000.00
05290 - Education, manufacture,license building handbook	259,000.00	1.0	259,000.00	259,000.00
052963 - Edu professional,license handbook buildings	25,000.00	1.0	25,000.00	25,000.00
052963963 - Instruc, code composite, consti, commission norm	205,600.00	1.0	205,600.00	205,600.00
056999 - 056693	529,996.00	1.0	529,996.00	529,996.00
06233369 - Instruct commission entrepreneurs Elec rules	60,098.00	1.0	60,098.00	60,098.00
062339 - Instruct commission electric engineering low,	62,336.00	1.0	62,336.00	62,336.00
06266639 - Instruct commission, energie electric engineering	6,399,965.00	1.0	6,399,965.00	6,399,965.00
063233 - Instruct, commission electric , bargaining low	25,366.00	1.0	25,366.00	25,366.00
063326 - Instruct, commission electromechanic rules	69,369.00	1.0	69,369.00	69,369.00
063996 - Instruct commission,construct civil build low,	63,999.00	1.0	63,999.00	63,999.00
06623 - Instruct commission electrotech genie ruling	366,936.00	1.0	366,936.00	366,936.00
066639 - Instruct commission, machinery labour lift Amanda	59,969.00	1.0	59,969.00	59,969.00
06693 - Instruct commission mechanic,water hydraulic	63,399.00	1.0	63,399.00	63,399.00
0669336 - Instruct, commission city municipal energie low	639,963.00	1.0	639,963.00	639,963.00
0669669 - Instruct,composit ,ph basic,acid,bpolicy , safety,	69,909.00	1.0	69,909.00	69,909.00
06993 - Instruc, drilling,turning ,foundry, paint , molecu	69,669.00	1.0	69,669.00	69,669.00
090008 - Manufacture, mathematics engineering funct	2,578,987.00	1.0	2,578,987.00	2,578,987.00
0963669 - Instruc,data initial unity central ,logic arithmet	2,500,693.00	1.0	2,500,693.00	2,500,693.00
0963696336 - Instruct,risk ass book,policy book,record,Manuel s	50,006,963.00	1.0	50,006,963.00	50,006,963.00
09699960 - Instruc,data algorithm,arborith , topographic web	10,000.00	1.0	10,000.00	10,000.00
09898 - Engineering,mining , maintence, repare, manufactur	209,909.00	2.0	419,818.00	209,909.00
0989986 - Engineering elect,energy norm , industrial energy	2,099,989.00	4.0	8,399,956.00	2,099,989.00
09963663 - Instruct,report booking registrar attandance clerk	526,990.00	1.0	526,990.00	526,990.00
09963663636 - Instruct, order book project exercise book skill	50,006.00	1.0	50,006.00	50,006.00
0996366369 - Instruct, exercise book completed rerwiten topics	500,063.00	2.0	1,000,126.00	500,063.00

09963699 - Instruc,court order data notice motion ,low , eng	500,693.00	1.0	500,693.00	500,693.00
099639 - Instruct, commission	266,963.00	1.0	266,963.00	266,963.00
099639369 - Instruc,court labour notice motion order ,Eng law	500,069.00	1.0	500,069.00	500,069.00
0996396 - Instruct, cybersecurity,policy safety database	2,589,963.00	1.0	2,589,963.00	2,589,963.00
099639636 - Instruct, data analyse systeme, plan	269,369.00	1.0	269,369.00	269,369.00
099639693 - Instruct ,court order , granted review labour,	50,009.00	1.0	50,009.00	50,009.00
0996399 - Instruct ,court order award ruling , rescission eg	500,069.00	1.0	500,069.00	500,069.00
09963996 - Instruct ,data commercial low liquid term,note	25,000.00	1.0	25,000.00	25,000.00
099639963 - Instruct , delivery servicmarket database,in out	296,399.00	1.0	296,399.00	296,399.00
099639966 - Instruct, booksaler , textbooks reward ,award	50,006.00	1.0	50,006.00	50,006.00
09969699 - Instruct,data economic account product,report	10,000.00	1.0	10,000.00	10,000.00
0996989 - Instruct , court order,award certificate,Eng low	50,006.00	1.0	50,006.00	50,006.00
09969896 - Instruct ,hr induct ,post salary visa tech ,award	19,006.00	1.0	19,006.00	19,006.00
099899 - Engineering,gov social municipality metering energ	235,689.00	2.0	471,378.00	235,689.00
0999363 - Instruct,court order, commission,legal bargaining	50,006.00	1.0	50,006.00	50,006.00
099936366 - Instruct,skill develop ,low rescission ruling,ilim	536,699.00	1.0	536,699.00	536,699.00
09996085 - Instruc,court order tax , financial eastate,eng	50,000.00	1.0	50,000.00	50,000.00
099963669 - Instruct, order guard court labour record bookepin	500,069.00	1.0	500,069.00	500,069.00
099987 - Engineering, Electrotechnolgy,power rate nomin	2,098,998.00	2.0	4,197,996.00	2,098,998.00
2000898 - Engineering, construct electric , electromechanic	239,000.00	2.0	478,000.00	239,000.00
200345 - Manufacture, AC,DC machine motor,alternator,	200,000.00	1.0	200,000.00	200,000.00
200989 - Engineering,Elec trade,load manufacture supply,	200,989.00	2.0	401,978.00	200,989.00
2309898 - Engineering,Elec ,electro static load ,dynamic ,ki	2,345,999.00	1.0	2,345,999.00	2,345,999.00
23456 - Manufacture, engineering science,power machine	200,547.00	1.0	200,547.00	200,547.00
234568 - Engineering,quality survey ,geomatic	209,898,765.00	1.0	209,898,765.00	209,898,765.00
3 - Electrical engineering sub contractor rate	90,000.00	1.0	90,000.00	90,000.00
4009898 - Engineering,construct elect,substation,station ele	2,000,989.00	3.0	6,002,967.00	2,000,989.00
456779 - Engineering build ,mecanic, electric support	203,040.00	2.0	406,080.00	203,040.00
569000 - Instruct commission, science engineering,PHY,che	56,999.00	1.0	56,999.00	56,999.00
96336369 - Instruct , exercise book.library biblio bookeping	50,006.00	2.0	100,012.00	50,006.00
Total		194.0	5,800,859,353.	29,901,336.8

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Summary				
Sales by item			5,800,859,353.00	
Other sales			601,070.00	
Cash sales			0.00	
Credits			(4,099,590,865.00)	
Total Sales			1,701,869,558.00	

Reports ›

VAT Reconciliation

From:

To:

Update

VAT Reconciliation Tshingombe From 1 January 2023 to 31 August 2023					
VAT Collected					
VAT Period	VAT Collected		Adjustments	Filed	Unfiled
Opening Balance					0.00
1 Jan 23 - 31 Jan 23	0.00				0.00
1 Feb 23 - 28 Feb 23	0.00				0.00
1 Mar 23 - 31 Mar 23	0.00				0.00
1 Apr 23 - 30 Apr 23	0.00				0.00
1 May 23 - 31 May 23	0.00				0.00
1 Jun 23 - 30 Jun 23	0.00				0.00
1 Jul 23 - 31 Jul 23	0.00				0.00
1 Aug 23 - 31 Aug 23	0.00				0.00
Total	0.00		0.00	0.00	0.00
VAT Paid					
VAT Period	VAT Paid	VAT On Imports	Adjustments	Filed	Unfiled
Opening Balance					0.00
1 Jan 23 - 31 Jan 23	0.00	0.00			0.00
1 Feb 23 - 28 Feb 23	0.00	0.00			0.00
1 Mar 23 - 31 Mar 23	0.00	0.00			0.00
1 Apr 23 - 30 Apr 23	0.00	0.00			0.00
1 May 23 - 31 May 23	0.00	0.00			0.00

1 Jun 23 - 30 Jun 23	0.00	0.00			0.00
1 Jul 23 - 31 Jul 23	0.00	0.00			0.00
1 Aug 23 - 31 Aug 23	0.00	0.00			0.00
Total	0.00	0.00	0.00	0.00	0.00

VAT Account Transactions

Date	Transaction	Amount
2 Aug 2023	mmsale@shoprite.co.za - Electrical engineering sub contractor rate	90,000.00
2 Aug 2023	mmsale@shoprite.co.za - Electrical engineering sub contractor rate	(90,000.00)
Total		0.00

VAT Owing

Opening Balance	0.00
Plus VAT Collected and Filed	0.00
Less VAT Paid and Filed	0.00
Less Payments Made	0.00
Closing Balance	0.00

VAT Account Summary

VAT Owing	0.00
Unfiled VAT	0.00
Balance at 31 August 2023	0.00
VAT Account Balance	1,144,756,869.00

You have **8 days** left in your trial, which includes all featuresChoose a plan to buy

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1. Reports

Reconciliation Reports

Contents

Pack date range: Last month
1 Jul 2023
31 Jul 2023
Columns
Compare with
Grouping/Summarising
Trial Balance
Tshingombe
As at 31 July 2023

404	Bank Fees	Expense	165,236.05		-
412	Consulting & Accounting	Expense		3,453,408,767.00	-
425	Freight & Courier	Expense		2,000,980,000.00	-
445	Light, Power, Heating	Expense		236,787,679.00	-
449	Motor Vehicle Expenses	Expense		209,200,547.00	-
498	Unrealised Currency Gains	Expense	2,849.93		-
610	Accounts Receivable	Current Asset	7,172,956,133.80		-
630	Inventory	Current Asset	1,999.99		-
710	Office Equipment	Fixed Asset		31,969,999.00	-
711	Less Accumulated Depreciation on Office Equipment	Fixed Asset		2,098,987.00	-
720	Computer Equipment	Fixed Asset		30,000.00	-
800	Accounts Payable	Current Liability		256,035.97	-
820	VAT	Current Liability		889,856,548.80	-
840	Historical Adjustment	Current Liability		8,519,656.00	-
860	Rounding	Current Liability		340,018,000.00	-
Total			7,173,126,219.77	7,173,126,219.77	-

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Compact view
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1. Reports

Receivable Invoice Summary

-

□ □ Xero standard report
□ Receivable Invoice Summary
□ □ Common formats
□ All quotes summary

 Approved, sent and paid
 Outstanding quotes summary
 Top customers
  Learn more
 Learn how to create a custom report
Date range: This month

1 Aug 2023

31 Aug 202

Date Search
Columns
Grouping/Summarising

Receivable I

Tshingombe
For the period 1 August 2023 to 31 August 2023

INV-0017	mmsale@shoprite.co.za	1 Aug 2023	1 Aug 2023	400	ZAR	495,785,952.30	495,785,952.30	495,785,952.30	495,785,952.30	Approved	Receivable Invoice	Sent
INV-0018	mmsale@shoprite.co.za	1 Aug 2023	9 Aug 2023	200	ZAR	4,217,298,024.85	4,217,298,024.85	4,217,298,024.85	4,217,298,024.85	Approved	Receivable Invoice	Sent
CN-0019	mmsale@shoprite.co.za	1 Aug 2023	1 Aug 2023	200	ZAR	(4,217,298,024.85)	(4,217,298,024.85)	(4,217,298,024.85)	(4,217,298,024.85)	Approved	Receivable Credit Note	Not sent
INV-0020	mmsale@shoprite.co.za	2 Aug 2023	2 Aug 2023	20349	ZAR	495,886,126.80	-	495,886,126.80	-	Paid	Receivable Invoice	Sent
CN-0021	mmsale@shoprite.co.za	2 Aug 2023	2 Aug 2023	20349	ZAR	(495,886,126.80)	-	(495,886,126.80)	-	Paid	Receivable Credit Note	Not sent
INV-0022	mmsale@shoprite.co.za	2 Aug 2023	7 Aug 2023	2345	ZAR	8,462,131,154.45	8,462,131,154.45	8,462,131,154.45	8,462,131,154.45	Draft	Receivable Invoice	Not sent
INV-0023	mmsale@shoprite.co.za	3 Aug 2023	3 Aug 2023	2500	ZAR	1,360,532.80	1,360,532.80	1,360,532.80	1,360,532.80	Approved	Receivable Invoice	Sent
IN	mmsale@s	3	3	25	Z	4,213,13	4,213,13	4,213,13	4,213,13	Draf	Rece	N

V-0024	hoprite.co.za	Aug 2023	Aug 2023	00	AR	6,948.50	6,948.50	6,948.50	6,948.50	t	ivable Invoice	ot sent
INV-0025	mmsale@shoprite.co.za	4 Aug 2023	10 Aug 2023	4200	ZAR	1,466,133.35	1,466,133.35	1,466,133.35	1,466,133.35	Voided	Receivable Invoice	Sent
INV-0026	mmsale@shoprite.co.za	5 Aug 2023	5 Aug 2023	,2569	ZAR	10,125,676.40	10,125,676.40	10,125,676.40	10,125,676.40	Approved	Receivable Invoice	Sent
INV-0029	mmsale@shoprite.co.za	5 Aug 2023	10 Aug 2023	58900	ZAR	8,119,133.40	8,119,133.40	8,119,133.40	8,119,133.40	Approved	Receivable Invoice	Sent
INV-0027	mmsale@shoprite.co.za	5 Aug 2023	5 Aug 2023	,2569	ZAR	10,125,676.40	10,125,676.40	10,125,676.40	10,125,676.40	Draft	Receivable Invoice	Not sent
INV-0028	mmsale@shoprite.co.za	5 Aug 2023	5 Aug 2023		ZAR	1,300,000.00	1,300,000.00	1,300,000.00	1,300,000.00	Draft	Receivable Invoice	Not sent
INV-0031	mmsale@shoprite.co.za	6 Aug 2023	6 Aug 2023	2500	ZAR	26,268,387.40	26,268,387.40	26,268,387.40	26,268,387.40	Approved	Receivable Invoice	Sent
INV-0033	mmsale@shoprite.co.za	6 Aug 2023	12 Aug 2023	25880	ZAR	115,103.50	115,103.50	115,103.50	115,103.50	Approved	Receivable Invoice	Sent
INV-0030	mmsale@shoprite.co.za	6 Aug 2023	6 Aug 2023	26369	ZAR	2,872,878,647.40	2,872,878,647.40	2,872,878,647.40	2,872,878,647.40	Draft	Receivable Invoice	Not sent
INV-0032	mmsale@shoprite.co.za	6 Aug 2023	6 Aug 2023	2500	ZAR	27,323,434.20	27,323,434.20	27,323,434.20	27,323,434.20	Draft	Receivable Invoice	Not sent
INV-	mmsale@shoprite.co.	7 A	8 A		ZA	2,530,983.25	2,530,983.25	2,530,983.25	2,530,983.25	Approve	Receivabl	Se

0036	za	ug 2023	ug 2023		R					d	e Invoice	nt
INV-0035	mmsale@shoprite.co.za	7 Aug 2023	9 Sep 2023	5269	ZAR	50,192,329.20	50,192,329.20	50,192,329.20	50,192,329.20	Approved	Receivable Invoice	Sent
INV-0034	mmsale@shoprite.co.za	7 Aug 2023	10 Aug 2023	5269	ZAR	50,134,826.90	50,134,826.90	50,134,826.90	50,134,826.90	Voided	Receivable Invoice	Sent
INV-0037	mmsale@shoprite.co.za	8 Aug 2023	12 Aug 2023	20960	ZAR	100,839,419.50	100,839,419.50	100,839,419.50	100,839,419.50	Voided	Receivable Invoice	Sent
INV-0038	mmsale@shoprite.co.za	8 Aug 2023	8 Aug 2023	25663	ZAR	85,590,362.30	85,590,362.30	85,590,362.30	85,590,362.30	Voided	Receivable Invoice	Sent
INV-0039	mmsale@shoprite.co.za	8 Aug 2023	8 Aug 2023	25663	ZAR	270,298,415.00	270,298,415.00	270,298,415.00	270,298,415.00	Voided	Receivable Invoice	Sent
INV-0041	mmsale@shoprite.co.za	9 Aug 2023	10 Sep 2023	25600	ZAR	1,206,477,144.00	1,206,477,144.00	1,206,477,144.00	1,206,477,144.00	Approved	Receivable Invoice	Not sent
INV-0040	mmsale@shoprite.co.za	9 Aug 2023	9 Aug 2023	25600	ZAR	1,206,477,144.00	1,206,477,144.00	1,206,477,144.00	1,206,477,144.00	Voided	Receivable Invoice	Sent
INV-0043	mmsale@shoprite.co.za	10 Aug 2023	12 Sep 2023	63369	ZAR	66,774,901.80	66,774,901.80	66,774,901.80	66,774,901.80	Approved	Receivable Invoice	Not sent
INV-0042	mmsale@shoprite.co.za	10 Aug 2023	10 Aug 2023	63369	ZAR	66,774,901.80	66,774,901.80	66,774,901.80	66,774,901.80	Voided	Receivable Invoice	Not sent
INV-00	mmsale@shoprite.co.za	11 Au	11 Au	54799	ZAR	67,729,158.00	67,729,158.00	67,729,158.00	67,729,158.00	Approved	Receivable	Sent

47		g 2023	g 2023								Invoice	
INV-0045	mmsale@shoprite.co.za	11 Aug 2023	29 Sep 2023	500	ZAR	21,354,191.30	21,354,191.30	21,354,191.30	21,354,191.30	Approved	Receivable Invoice	Not sent
INV-0046	mmsale@shoprite.co.za	11 Aug 2023	11 Aug 2023		ZAR	125,814,380.35	125,814,380.35	125,814,380.35	125,814,380.35	Draft	Receivable Invoice	Not sent
INV-0044	mmsale@shoprite.co.za	11 Aug 2023	11 Aug 2023	500	ZAR	21,354,191.30	21,354,191.30	21,354,191.30	21,354,191.30	Voided	Receivable Invoice	Not sent
Total								19,472,479,128.80	19,472,479,128.80			

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Compact view
Items per page
Showing items 1-32 of 32

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Realised Gains and Losses

Date range: This month
1 Aug 2023
31 Aug 202
Source type
Currencies (required)
2 Currencie
Columns
Realised Ga
Tshingombe
For the period 1 August 2023 to 31 August 2023
Accounts Receivable & Payable
Currencies: ZAR, USD
You have **8 days** left in your trial, which includes all featuresChoose a plan to buy

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1. Reports

Payable Invoice Summary

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 All purchase orders summary
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 Approved and paid
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 Learn how to create a custom report
Date range: This month
1 Aug 2023
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Date Search
Columns
Grouping/Summarising
Payable Inv
Tshingombe
For the period 1 August 2023 to 31 August 2023

3 Aug 2023	mmsale@shoprite.co.za	Payable Invoice	2089	8 Aug 2023	651,034.10	651,034.10	651,034.10	651,034.10	Approved
3 Aug 2023	mmsale@shoprite.co.za	Payable Invoice	2089	3 Aug 2023	651,034.10	651,034.10	651,034.10	651,034.10	Approved
3 Aug 2023	mmsale@shoprite.co.za	Payable Invoice	2089	3 Aug 2023	651,034.10	651,034.10	651,034.10	651,034.10	Draft
3 Aug 2023	tshingombekb@gmail.com	Payable Invoice	2536	6 Aug 2023	751,530.65	751,530.65	751,530.65	751,530.65	Draft
3 Aug 202	tshingombekb@gmail.com	Payable Credit	2000	3 Aug 20	(774,352.05)	(774,352.05)	(774,352.05)	(774,352.05)	Approved

3		Note		23					
Total							1,930,280.90	1,930,280.90	

☑

Compact view
Showing items 1-6 of 6
You have **8 days** left in your trial, which includes all featuresChoose a plan to buy

1. Dashboard
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Current pageOpens in new window

1. Reports

Payable Invoice Detail

-

□ □ Xero standard report
□ Payable Invoice Detail
□ □ Common formats
□ Top suppliers
□ All purchase orders detail
□ Outstanding purchase orders detail
□ □ Learn more
□ Learn how to create a custom report
Date range: This month

1 Aug 2023

31 Aug 202

Date Search
Columns
Grouping/Summarising

Payable Invc

Tshingombe
For the period 1 August 2023 to 31 August 2023

mmsale@shoprite.co.za																												
3 Aug 2023	Payable	2089	0520	Education technicLpedago	1	2000	3,000.00	23,000.00	651,034.10	2000	3,000.00	23,000.00	651,034.10	Approve														

	Invoice			gy,psychengineering										d														
3 Aug 2023	Payable Invoice	2089	005201	Education teacher engineering educare didact	1	5230	784.50	6,014.50	651,034.10	5230	784.50	6,014.50	651,034.10	Approved														
3 Aug 2023	Payable Invoice	2089	0052040	Educare Engineering,instruction manufacture indust	1	20000	3,000.00	23,000.00	651,034.10	20000	3,000.00	23,000.00	651,034.10	Approved														
3 Aug 2023	Payable Invoice	2089	0052035	Education technology science, manufacture, lessons	1	20000	3,000.00	23,000.00	651,034.10	20000	3,000.00	23,000.00	651,034.10	Approved														
3 Aug 2023	Payable Invoi	2089	0052034	005203	1	52000	7,800.00	59,800.00	651,034.10	52000	7,800.00	59,800.00	651,034.10	Approved														

	ce																											
3 Aug 2023	Payable Invoice	2089	00520888	Education technology engineering, lessons, module	1	2000	3,000.00	23,000.00	651,034.10	2000	3,000.00	23,000.00	651,034.10	Approved														
3 Aug 2023	Payable Invoice	2089	005203	Education technology, Implementation syst educu	1	2000	-	20,000.00	651,034.10	2000	-	20,000.00	651,034.10	Approved														
3 Aug 2023	Payable Invoice	2089	00520988	Edu training instructor traii, production manufact	1	52006	7,800.90	59,806.90	651,034.10	52006	7,800.90	59,806.90	651,034.10	Approved														
3 Aug 2023	Payable Invoice	2089	0520008,	Training trade educare, manufacture, inspection	1	20089	30,013.35	230,102.35	651,034.10	20089	30,013.35	230,102.35	651,034.10	Approved														
3 Aug 202	Pay	208	005	Training han	1	200	3,00	23,000	651,03	200	3,00	23,000	651,03	App														

3	ableInvoice	9	209	dbook build license ,hand book use		00	0.00	.00	4.10	00	0.00	.00	4.10	roved														
3 Aug 2023	PayableInvoice	2089	005208	Training trainer engineering, construct handbook, l	1	20009	3,001.35	23,010.35	651,034.10	20009	3,001.35	23,010.35	651,034.10	Approved														
3 Aug 2023	PayableInvoice	2089	006206	Train trainer instruc ,license certificate build ,	1	20000	-	20,000.00	651,034.10	20000	-	20,000.00	651,034.10	Approved														
3 Aug 2023	PayableInvoice	2089	0052008	Training license , certificate product, and police	1	2000	300.00	2,300.00	651,034.10	2000	300.00	2,300.00	651,034.10	Approved														
3 Aug 2023	PayableI	2089	0052078	Training trainer trade , license,.a	1	20000	3,000.00	23,000.00	651,034.10	20000	3,000.00	23,000.00	651,034.10	Approved														

	nvoice			nd policy																								
3 Aug 2023	Payable Invoice	2089	00530034	Trade business used certificate,and License, policy	1	2000	3,000.00	23,000.00	651,034.10	2000	3,000.00	23,000.00	651,034.10	Approved														
3 Aug 2023	Payable Invoice	2089	05200	Training manager system, Quality Assurance	1	2000	300.00	2,300.00	651,034.10	2000	300.00	2,300.00	651,034.10	Approved														
3 Aug 2023	Payable Invoice	2089	005200	Training, Quality Assurance	1	5200	7,800.00	59,800.00	651,034.10	5200	7,800.00	59,800.00	651,034.10	Approved														
3 Aug 2023	Payable Invoic	2089	00520980	Training manager system, defense protect, norm	1	2000	300.00	2,300.00	651,034.10	2000	300.00	2,300.00	651,034.10	Approved														

	e																											
3 Aug 2023	PayableInvoice	2089	005209809	Defense norm quality control, survey, product	1	4000	600.00	4,600.00	651,034.10	4000	600.00	4,600.00	651,034.10	Approved														
3 Aug 2023	PayableInvoice	2089	00520	Education technicL pedagogy,psych engineering	1	2000	3,000.00	23,000.00	651,034.10	2000	3,000.00	23,000.00	651,034.10	Approved														
3 Aug 2023	PayableInvoice	2089	005201	Education teacher engineering educare didact	1	5230	784.50	6,014.50	651,034.10	5230	784.50	6,014.50	651,034.10	Approved														
3 Aug 2023	PayableInvoice	2089	052040	Educare Engineering,instruction manufacture indust	1	2000	3,000.00	23,000.00	651,034.10	2000	3,000.00	23,000.00	651,034.10	Approved														
3 Aug 2023	Paya	2089	0052	Education tech	1	2000	3,000.	23,000.0	651,034.	2000	3,000.	23,000.0	651,034.	Appr														

	ble Invoice		035	nology science, manufacture, lessons		0	00	0	10	0	00	0	10	oved														
3 Aug 2023	Payable Invoice	2089	0052034	005203	1	5200	7,800.00	59,800.00	651,034.10	5200	7,800.00	59,800.00	651,034.10	Approved														
3 Aug 2023	Payable Invoice	2089	0052088	Education technology engineering, lessons, module	1	2000	3,000.00	23,000.00	651,034.10	2000	3,000.00	23,000.00	651,034.10	Approved														
3 Aug 2023	Payable Invoice	2089	0052003	Education technology, Implementation syst educu	1	2000	-	20,000.00	651,034.10	2000	-	20,000.00	651,034.10	Approved														
3 Aug 2023	Payable In	2089	0052098	Edu training instructor traii, producti	1	5206	7,800.90	59,806.90	651,034.10	5206	7,800.90	59,806.90	651,034.10	Approved														

	voice			on manufact																							
3 Aug 2023	Payable Invoice	2089	05200008,	Training trade educare, manufacture, inspection	1	20089	30,013.35	230,102.35	651,034.10	20089	30,013.35	230,102.35	651,034.10	Approved													
3 Aug 2023	Payable Invoice	2089	0052009	Training handbook build license ,hand book use	1	20000	3,000.00	23,000.00	651,034.10	20000	3,000.00	23,000.00	651,034.10	Approved													
3 Aug 2023	Payable Invoice	2089	0052008	Training trainer engineering, construct handbook, l	1	20009	3,001.35	23,010.35	651,034.10	20009	3,001.35	23,010.35	651,034.10	Approved													
3 Aug 2023	Payable Invoice	2089	00520	Education technicL pedagogy,psych engineering	1	20000	3,000.00	23,000.00	651,034.10	20000	3,000.00	23,000.00	651,034.10	Draft													

3 Aug 2023	Payable Invoice	2089	0052001	Education teacher engineering educare didact	1	5230	784.50	6,014.50	651,034.10	5230	784.50	6,014.50	651,034.10	Draft														
3 Aug 2023	Payable Invoice	2089	052040	Educare Engineering,instruction manufacture indust	1	20000	3,000.00	23,000.00	651,034.10	20000	3,000.00	23,000.00	651,034.10	Draft														
3 Aug 2023	Payable Invoice	2089	006206	Train trainer instruc ,licence certificate build ,	1	20000	-	20,000.00	651,034.10	20000	-	20,000.00	651,034.10	Approved														
3 Aug 2023	Payable Invoice	2089	0052008	Training licence , certificate product, and police	1	2000	300.00	2,300.00	651,034.10	2000	300.00	2,300.00	651,034.10	Approved														
3 Aug 2023	Payab	2089	00520	Training trainer trad	1	20000	3,000.0	23,000.00	651,034.10	20000	3,000.0	23,000.00	651,034.10	Appro														

	leInvoice		78	e , license,.and policy			0				0			ved														
3 Aug 2023	PayableInvoice	2089	0053034	Trade business used certificate,and License, policy	1	2000	3,000.00	23,000.00	651,034.10	2000	3,000.00	23,000.00	651,034.10	Approved														
3 Aug 2023	PayableInvoice	2089	05200	Training manager system, Quality Assurance	1	2000	300.00	2,300.00	651,034.10	2000	300.00	2,300.00	651,034.10	Approved														
3 Aug 2023	PayableInvoice	2089	005200	Training , Quality Assurance	1	5200	7,800.00	59,800.00	651,034.10	5200	7,800.00	59,800.00	651,034.10	Approved														
3 Aug 2023	PayableInv	2089	00520980	Training manager system, defense protect,	1	2000	300.00	2,300.00	651,034.10	2000	300.00	2,300.00	651,034.10	Approved														

	oice			norm																								
3 Aug 2023	PayableInvoice	2089	005209809	Defense norm quality control, survey, product	1	4000	600.00	4,600.00	651,034.10	4000	600.00	4,600.00	651,034.10	Approved														
3 Aug 2023	PayableInvoice	2089	0052035	Education technology science, manufacture, lessons	1	2000	3,000.00	23,000.00	651,034.10	2000	3,000.00	23,000.00	651,034.10	Draft														
3 Aug 2023	PayableInvoice	2089	0052034	005203	1	5200	7,800.00	59,800.00	651,034.10	5200	7,800.00	59,800.00	651,034.10	Draft														
3 Aug 2023	PayableInvoice	2089	0052088	Education technology engineering, lessons, module	1	2000	3,000.00	23,000.00	651,034.10	2000	3,000.00	23,000.00	651,034.10	Draft														
3	P	2	0	Edu	1	2	-	20	65	2	-	20	65	D														

Aug 2023	ayableInvoice	089	05203	cation technology, Implementation syst educu		0000		,000.00	1,034.10	0000		,000.00	1,034.10	raft														
3 Aug 2023	PayableInvoice	2089	0052098	Edu training instructor traii, production manufact	1	52006	7,800.90	59,806.90	651,034.10	52006	7,800.90	59,806.90	651,034.10	Draft														
3 Aug 2023	PayableInvoice	2089	0520008,	Training trade educare, manufacture, inspection	1	20089	30,013.35	230,102.35	651,034.10	20089	30,013.35	230,102.35	651,034.10	Draft														
3 Aug 2023	PayableInvoice	2089	005209	Training handbook build license ,hand book use	1	20000	3,000.00	23,000.00	651,034.10	20000	3,000.00	23,000.00	651,034.10	Draft														
3 Aug 2023	Payabl	2089	005208	Training trainer engineer	1	20009	3,001.35	23,010.35	651,034.10	20009	3,001.35	23,010.35	651,034.10	Draft														

	e Invoice			ing, construct handbook, l																								
3 Aug 2023	Payable Invoice	2089	0062066	Train trainer instruc ,license certificate build ,	1	2000	-	20,000.00	651,034.10	2000	-	20,000.00	651,034.10	Draft														
3 Aug 2023	Payable Invoice	2089	0052008	Training license , certificate product, and police	1	2000	300.00	2,300.00	651,034.10	2000	300.00	2,300.00	651,034.10	Draft														
3 Aug 2023	Payable Invoice	2089	0052078	Training trainer trade , license,.and policy	1	2000	3,000.00	23,000.00	651,034.10	2000	3,000.00	23,000.00	651,034.10	Draft														
3 Aug 2023	Payable Invo	2089	0053034	Trade business used certificate,and License,	1	2000	3,000.00	23,000.00	651,034.10	2000	3,000.00	23,000.00	651,034.10	Draft														

	ice			policy																								
3 Aug 2023	Payable Invoice	2089	005200	Training manager system, Quality Assurance	1	2000	3000.00	2,300.00	651,034.10	2000	3000.00	2,300.00	651,034.10	Draft														
3 Aug 2023	Payable Invoice	2089	005200	Training, Quality Assurance	1	5200	7,8000.00	59,800.00	651,034.10	5200	7,8000.00	59,800.00	651,034.10	Draft														
3 Aug 2023	Payable Invoice	2089	00520980	Training manager system, defense protect, norm	1	2000	3000.00	2,300.00	651,034.10	2000	3000.00	2,300.00	651,034.10	Draft														
3 Aug 2023	Payable Invoice	2089	005209809	Defense norm quality control, survey, product	1	4000	6000.00	4,600.00	651,034.10	4000	6000.00	4,600.00	651,034.10	Draft														
Total					57						23	1,95																

mmsale@shoprite.co.za											9,100.30	3,102.30																
tshingombekb@gmail.com																												
3 Aug 2023	PayableInvoice	2536	00520	Education technicL pedagogy.psych engineering	1	2000	3,000.00	23,000.00	751,530.65	2000	3,000.00	23,000.00	751,530.65	Draft														
3 Aug 2023	PayableInvoice	2536	005200	Training , Quality Assurance	1	5200	7,800.00	59,800.00	751,530.65	5200	7,800.00	59,800.00	751,530.65	Draft														
3 Aug 2023	PayableInvoice	2536	0052008	Training licence , certificate product, and police	1	2000	300.00	2,300.00	751,530.65	2000	300.00	2,300.00	751,530.65	Draft														
3 Aug 2023	PayableInvoi	2536	005201	Education teacher engineering educare didact	1	5230	784.50	6,014.50	751,530.65	5230	784.50	6,014.50	751,530.65	Draft														

	ce																											
3 Aug 2023	Payable Invoice	2536	005203	Education technology, Implementation syst educu	1	2000	-	20,000.00	751,530.65	2000	-	20,000.00	751,530.65	Draft														
3 Aug 2023	Payable Invoice	2536	005203	Education technology, Implementation syst educu	1	2000	-	20,000.00	751,530.65	2000	-	20,000.00	751,530.65	Draft														
3 Aug 2023	Payable Invoice	2536	0052034	005203	1	5200	7,800.00	59,800.00	751,530.65	5200	7,800.00	59,800.00	751,530.65	Draft														
3 Aug 2023	Payable Invoice	2536	0052035	Education technology science, manufacture, lessons	1	2000	3,000.00	23,000.00	751,530.65	2000	3,000.00	23,000.00	751,530.65	Draft														
3 Aug 202	Pay	253	005	Training train	1	200	3,00	23,000	751,53	200	3,00	23,000	751,53	Draf														

3	able Invoice	6	2078	er trade , license,.and policy		00	0.00	.00	0.65	00	0.00	.00	0.65	t														
3 Aug 2023	Payable Invoice	2536	0052078	Training trainer trade , license,.and policy	1	20000	3,000.00	23,000.00	751,530.65	20000	3,000.00	23,000.00	751,530.65	Draft														
3 Aug 2023	Payable Invoice	2536	0052088	Education technology engineering, lessons, module	1	20000	3,000.00	23,000.00	751,530.65	20000	3,000.00	23,000.00	751,530.65	Draft														
3 Aug 2023	Payable Invoice	2536	005209	Training handbook build license ,hand book use	1	20000	3,000.00	23,000.00	751,530.65	20000	3,000.00	23,000.00	751,530.65	Draft														
3 Aug 2023	Payable I	2536	0052098	Edu training instructor traii, prod	1	52006	7,800.90	59,806.90	751,530.65	52006	7,800.90	59,806.90	751,530.65	Draft														

	nvoice			uction manufact																								
3 Aug 2023	Payable Invoice	2536	0052098	Edu training instructor traii, production manufact	1	52006	7,800.90	59,806.90	751,530.65	52006	7,800.90	59,806.90	751,530.65	Draft														
3 Aug 2023	Payable Invoice	2536	00520980	Training manager system, defense protect, norm	1	2000	300.00	2,300.00	751,530.65	2000	300.00	2,300.00	751,530.65	Draft														
3 Aug 2023	Payable Invoice	2536	005209809	Defense norm quality control, survey, product	1	4000	600.00	4,600.00	751,530.65	4000	600.00	4,600.00	751,530.65	Draft														
3 Aug 2023	Payable Invoic	2536	0053034	Trade business used certificate,and License, policy	1	20000	3,000.00	23,000.00	751,530.65	20000	3,000.00	23,000.00	751,530.65	Draft														

	e																											
3 Aug 2023	Payable Invoice	2536	006206	Train trainer instruc ,license certificate build ,	1	2000	-	20,000.00	751,530.65	2000	-	20,000.00	751,530.65	Draft														
3 Aug 2023	Payable Invoice	2536	052040	Educare Engineering,instruction manufacture indust	1	2000	3,000.00	23,000.00	751,530.65	2000	3,000.00	23,000.00	751,530.65	Draft														
3 Aug 2023	Payable Invoice	2536	0520008,	Training trade educare, manufacture, inspection	1	20089	30,013.35	230,102.35	751,530.65	20089	30,013.35	230,102.35	751,530.65	Draft														
3 Aug 2023	Payable Invoice	2536	052040	Educare Engineering,instruction manufacture indust	1	2000	3,000.00	23,000.00	751,530.65	2000	3,000.00	23,000.00	751,530.65	Draft														
3 Aug 2023	Paya	2000	0052	Education tech	-1	2000	(3,000.	(23,000.	(774,352	2000	(3,000.	(23,000.	(774,352	Appr														

	bleCreditNote		0	nicLpedagogy,psychengineering		0	00)	00)	.05)	0	00)	00)	.05)	oved														
3 Aug 2023	PayableCreditNote	2000	005200	Training , Quality Assurance	-1	52000	(7,800.00)	(59,800.00)	(774,352.05)	52000	(7,800.00)	(59,800.00)	(774,352.05)	Approved														
3 Aug 2023	PayableCreditNote	2000	005201	Education teacher engineering educare didact	-1	5230	(784.50)	(6,014.50)	(774,352.05)	5230	(784.50)	(6,014.50)	(774,352.05)	Approved														
3 Aug 2023	PayableCreditNote	2000	005201	Education teacher engineering educare didact	-1	5230	(784.50)	(6,014.50)	(774,352.05)	5230	(784.50)	(6,014.50)	(774,352.05)	Approved														
3	P	2	0	Edu	-	2	-	(2	(7	2	-	(2	(7	A														

Aug 2023	ayableCreditNote	000	052003	cation technology, Implementation syst educu	1	0000		0,000.00)	74,352.05)	0000		0,000.00)	74,352.05)	pproved														
3 Aug 2023	PayableCreditNote	2000	0052034	005203	-1	52000	(7,800.00)	(59,800.00)	(774,352.05)	52000	(7,800.00)	(59,800.00)	(774,352.05)	Approved														
3 Aug 2023	PayableCreditNote	2000	0052035	Education technology science, manufacture, lessons	-1	20000	(3,000.00)	(23,000.00)	(774,352.05)	20000	(3,000.00)	(23,000.00)	(774,352.05)	Approved														
3 Aug 2023	PayableCreditNo	2000	0052078	Training trainer trade , license,.and policy	-1	20000	(3,000.00)	(23,000.00)	(774,352.05)	20000	(3,000.00)	(23,000.00)	(774,352.05)	Approved														

	te																											
3 Aug 2023	PayableCreditNote	2000	0520040	Educare Engineering,instruction manufacture indust	-1	20000	(3,000.00)	(23,000.00)	(774,352.05)	20000	(3,000.00)	(23,000.00)	(774,352.05)	Approved														
3 Aug 2023	PayableCreditNote	2000	0520040	Educare Engineering,instruction manufacture indust	-1	20000	(3,000.00)	(23,000.00)	(774,352.05)	20000	(3,000.00)	(23,000.00)	(774,352.05)	Approved														
3 Aug 2023	PayableCreditNote	2000	05200008,	Training trade educare, manufacture, inspection	-1	20089	(30,013.35)	(230,102.35)	(774,352.05)	20089	(30,013.35)	(230,102.35)	(774,352.05)	Approved														
3 Aug 2023	PayableCred	2000	05200	Training manager system, Quality Assurance	-1	2000	(300.00)	(2,300.00)	(774,352.05)	2000	(300.00)	(2,300.00)	(774,352.05)	Approved														

	itNote																											
3 Aug 2023	PayableCreditNote	2000	006206	Train trainer instruc ,license certificate build ,	-1	2000	-	(20,000.00)	(774,352.05)	2000	-	(20,000.00)	(774,352.05)	Approved														
3 Aug 2023	PayableCreditNote	2000	00530334	Trade business used certificate,and License, policy	-1	2000	(3,000.00)	(23,000.00)	(774,352.05)	2000	(3,000.00)	(23,000.00)	(774,352.05)	Approved														
3 Aug 2023	PayableCreditNote	2000	005209809	Defense norm quality control, survey, product	-1	4000	(600.00)	(4,600.00)	(774,352.05)	4000	(600.00)	(4,600.00)	(774,352.05)	Approved														
3 Aug 2023	PayableC	2000	00520980	Training manager system, defense	-1	2000	(300.00)	(2,300.00)	(774,352.05)	2000	(300.00)	(2,300.00)	(774,352.05)	Approved														

	reditNote			protect, norm																								
3 Aug 2023	PayableCreditNote	2000	00520098	Edu training instructor traii, production manufact	-1	52006	(7,800.90)	(59,806.90)	(774,352.05)	52006	(7,800.90)	(59,806.90)	(774,352.05)	Approved														
3 Aug 2023	PayableCreditNote	2000	00520098	Edu training instructor traii, production manufact	-1	52006	(7,800.90)	(59,806.90)	(774,352.05)	52006	(7,800.90)	(59,806.90)	(774,352.05)	Approved														
3 Aug 2023	PayableCreditNote	2000	00520098	Edu training instructor traii, production manufact	-1	52006	(7,800.90)	(59,806.90)	(774,352.05)	52006	(7,800.90)	(59,806.90)	(774,352.05)	Approved														

☑

Compact view
Items per page
Showing items 1-100 of 104

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1. eports

Management Report

Contents

Pack date range: Last month

1 Jul 2023

31 Jul 2023

Compare with

Executive S

Tshingombe
For the month ended 31 July 2023

Cash			
Cash received	-	-	-
Cash spent	-	-	-
Cash surplus (deficit)	-	-	-
Closing bank balance	-	-	-
Profitability			
Income	-	-	-
Direct costs	-	-	-
Gross profit (loss)	-	-	-
Other income	-	-	-
Expenses	(5,900,208,907.02)	-	-
Profit (loss)	5,900,208,907.02	-	-
Balance Sheet			
Debtors	7,172,956,133.80	-	-

Creditors	256,035.97	-	-
Net assets	5,900,208,907.02	-	-
Sales			
Number of invoices issued	6.00	-	-
Average value of invoices	1,047,181,439.17	-	-
Performance			
Gross profit margin (%)	-	-	-
Net profit margin (%)	-	-	-
Return on investment (p.a.) (%)	1,200.00	-	-
Position			
Average debtor days	-	-	-
Average creditor days	-	-	-
Short term cash forecast	7,172,700,097.83	-	-
Current assets to liabilities	5.79	-	-
Term assets to liabilities	-	-	-

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Compact view

You have **8 days** left in your trial, which includes all featuresChoose a plan to buy

1. Dashboard
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1. Reports
2.

3. Custom

Journal Report

Go to manual journalsAdd new journal
Date range: This month

1 Aug 2023

31 Aug 202

Columns
Order by

Journal Rep

Tshingombe
For the period 1 August 2023 to 31 August 2023

ID 62 mmsale@shoprite.co.za														
11 Aug 2023	62	610	Accounts Receivable	67,729,158.00	-	11 Aug 2023	fiston tshingombe							
11 Aug 2023	62	260	Other Revenue	-	500,980.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	62	260	Other Revenue	-	50,098.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	62	260	Other Revenue	-	50,000.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	62	260	Other Revenue	-	500,989.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	62	260	Other Revenue	-	50,000.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	62	260	Other Revenue	-	500,989.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	62	260	Other Revenue	-	5,009,898.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	62	260	Other Revenue	-	50,009.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	62	260	Other Revenue	-	500,098.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	62	260	Other Revenue	-	500,098.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	62	260	Other Revenue	-	50,000,693.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	62	260	Other Revenue	-	5,000.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	62	260	Other Revenue	-	500,063.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	62	260	Other Revenue	-	569,999.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	62	260	Other Revenue	-	56,000.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	62	260	Other Revenue	-	50,006.00	11 Aug 2023	fiston tshingombe							

11 Aug 2023	62	820	VAT	-	8,834,238.00	11 Aug 2023	fiston tshingombe								
Total				67,729,158.00	67,729,158.00										
ID 61 mmsale@shoprite.co.za															
11 Aug 2023	61	610	Accounts Receivable	21,354,191.30	-	11 Aug 2023	fiston tshingombe								
11 Aug 2023	61	260	Other Revenue	-	569,999.00	11 Aug 2023	fiston tshingombe								
11 Aug 2023	61	260	Other Revenue	-	523,699.00	11 Aug 2023	fiston tshingombe								
11 Aug 2023	61	260	Other Revenue	-	50,000.00	11 Aug 2023	fiston tshingombe								
11 Aug 2023	61	260	Other Revenue	-	50,098.00	11 Aug 2023	fiston tshingombe								
11 Aug 2023	61	260	Other Revenue	-	50,000.00	11 Aug 2023	fiston tshingombe								
11 Aug 2023	61	260	Other Revenue	-	58,000.00	11 Aug 2023	fiston tshingombe								
11 Aug 2023	61	260	Other Revenue	-	500,989.00	11 Aug 2023	fiston tshingombe								
11 Aug 2023	61	260	Other Revenue	-	500,098.00	11 Aug 2023	fiston tshingombe								
11 Aug 2023	61	260	Other Revenue	-	5,009,898.00	11 Aug 2023	fiston tshingombe								
11 Aug 2023	61	260	Other Revenue	-	500,989.00	11 Aug 2023	fiston tshingombe								
11 Aug 2023	61	260	Other Revenue	-	50,009.00	11 Aug 2023	fiston tshingombe								
11 Aug 2023	61	260	Other Revenue	-	5,000.00	11 Aug 2023	fiston tshingombe								
11 Aug 2023	61	260	Other Revenue	-	5,009,878.00	11 Aug 2023	fiston tshingombe								
11 Aug 2023	61	260	Other Revenue	-	50,000.00	11 Aug 2023	fiston tshingombe								
11 Aug 2023	61	260	Other Revenue	-	5,090,098.00	11 Aug 2023	fiston tshingombe								
11 Aug 2023	61	260	Other Revenue	-	50,009.00	11 Aug 2023	fiston tshingombe								
11 Aug 2023	61	260	Other Revenue	-	500,098.00	11 Aug 2023	fiston tshingombe								
11 Aug 2023	61	820	VAT	-	2,785,329.30	11 Aug 2023	fiston tshingombe								
Total				21,354,191.30	21,354,191.30										
ID 60 Reversed: mmsale@shoprite.co.za - Reversal of ID 59															
11 Aug 2023	60	260	Other Revenue	523,699.00	-	11 Aug 2023	fiston tshingombe								
11 Aug 2023	60	260	Other Revenue	5,009,898.00	-	11 Aug 2023	fiston tshingombe								
11 Aug 2023	60	610	Accounts Receivable	-	21,354,191.30	11 Aug 2023	fiston tshingombe								
11 Aug 2023	60	260	Other Revenue	500,098.00	-	11 Aug 2023	fiston tshingombe								
11 Aug 2023	60	260	Other Revenue	50,000.00	-	11 Aug 2023	fiston tshingombe								
11 Aug 2023	60	260	Other Revenue	569,999.00	-	11 Aug 2023	fiston tshingombe								
11 Aug 2023	60	260	Other Revenue	50,000.00	-	11 Aug 2023	fiston tshingombe								

11 Aug 2023	60	260	Other Revenue	500,098.00	-	11 Aug 2023	fiston tshingombe							
11 Aug 2023	60	260	Other Revenue	50,009.00	-	11 Aug 2023	fiston tshingombe							
11 Aug 2023	60	260	Other Revenue	58,000.00	-	11 Aug 2023	fiston tshingombe							
11 Aug 2023	60	260	Other Revenue	5,090,098.00	-	11 Aug 2023	fiston tshingombe							
11 Aug 2023	60	260	Other Revenue	500,989.00	-	11 Aug 2023	fiston tshingombe							
11 Aug 2023	60	820	VAT	2,785,329.30	-	11 Aug 2023	fiston tshingombe							
11 Aug 2023	60	260	Other Revenue	500,989.00	-	11 Aug 2023	fiston tshingombe							
11 Aug 2023	60	260	Other Revenue	5,009,878.00	-	11 Aug 2023	fiston tshingombe							
11 Aug 2023	60	260	Other Revenue	50,098.00	-	11 Aug 2023	fiston tshingombe							
11 Aug 2023	60	260	Other Revenue	5,000.00	-	11 Aug 2023	fiston tshingombe							
11 Aug 2023	60	260	Other Revenue	50,000.00	-	11 Aug 2023	fiston tshingombe							
11 Aug 2023	60	260	Other Revenue	50,009.00	-	11 Aug 2023	fiston tshingombe							
Total				21,354,191.30	21,354,191.30									
ID 59 mmsale@shoprite.co.za														
11 Aug 2023	59	610	Accounts Receivable	21,354,191.30	-	11 Aug 2023	fiston tshingombe							
11 Aug 2023	59	260	Other Revenue	-	569,999.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	59	260	Other Revenue	-	523,699.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	59	260	Other Revenue	-	50,000.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	59	260	Other Revenue	-	50,098.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	59	260	Other Revenue	-	50,000.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	59	260	Other Revenue	-	58,000.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	59	260	Other Revenue	-	500,989.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	59	260	Other Revenue	-	500,098.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	59	260	Other Revenue	-	5,009,898.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	59	260	Other Revenue	-	500,989.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	59	260	Other Revenue	-	50,009.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	59	260	Other Revenue	-	5,000.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	59	260	Other Revenue	-	5,009,878.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	59	260	Other Revenue	-	50,000.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	59	260	Other Revenue	-	5,090,098.00	11 Aug 2023	fiston tshingombe							
11 Aug	5	26	Other	-	50,009.00	11 Aug	fiston							

2023	9	0	Revenue			2023	tshingombe							
11 Aug 2023	59	260	Other Revenue	-	500,098.00	11 Aug 2023	fiston tshingombe							
11 Aug 2023	59	820	VAT	-	2,785,329.30	11 Aug 2023	fiston tshingombe							
Total				21,354,191.30	21,354,191.30									
ID 58 mmsale@shoprite.co.za														
10 Aug 2023	58	610	Accounts Receivable	66,774,901.80	-	10 Aug 2023	fiston tshingombe							
10 Aug 2023	58	260	Other Revenue	-	5,000.00	10 Aug 2023	fiston tshingombe							
10 Aug 2023	58	260	Other Revenue	-	25,000.00	10 Aug 2023	fiston tshingombe							
10 Aug 2023	58	260	Other Revenue	-	500,063.00	10 Aug 2023	fiston tshingombe							
10 Aug 2023	58	260	Other Revenue	-	500,852.00	10 Aug 2023	fiston tshingombe							
10 Aug 2023	58	260	Other Revenue	-	5,000,069.00	10 Aug 2023	fiston tshingombe							
10 Aug 2023	58	260	Other Revenue	-	500,063.00	10 Aug 2023	fiston tshingombe							
10 Aug 2023	58	260	Other Revenue	-	500,069.00	10 Aug 2023	fiston tshingombe							
10 Aug 2023	58	260	Other Revenue	-	500,063.00	10 Aug 2023	fiston tshingombe							
10 Aug 2023	58	260	Other Revenue	-	50,006,963.00	10 Aug 2023	fiston tshingombe							
10 Aug 2023	58	260	Other Revenue	-	526,990.00	10 Aug 2023	fiston tshingombe							
10 Aug 2023	58	820	VAT	-	8,709,769.80	10 Aug 2023	fiston tshingombe							
Total				66,774,901.80	66,774,901.80									
ID 57 Reversed: mmsale@shoprite.co.za - Reversal of ID 56														
10 Aug 2023	57	260	Other Revenue	25,000.00	-	10 Aug 2023	fiston tshingombe							
10 Aug 2023	57	260	Other Revenue	5,000.00	-	10 Aug 2023	fiston tshingombe							

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Compact view
Items per page
Showing items 1-100 of 840
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1. Reports

Inventory Item List

Date: Today
13 Aug 202
Columns
Grouping/Summarising
Inventory Ite
Tshingombe
As at 13 August 2023

Opening Balance				-	-	-	-							
00123	Manufacture material conductor, cable,wire		Untracked	-	50,000.00	-	-							
005209	Training handbook build license ,hand book use	Training handbook build license ,hand book use	Untracked	20,000.00	-	-	-							
00526	Instruct ,visa electrical ,meter energy, permit		Untracked	-	25,000.00	-	-							
007236	Instruct,com, I'd visa ,wegh,scale,size, plate sup		Untracked	-	52,669.00	-	-							
200989	Engineering,Elec trade,load manufacture supply,		Untracked	-	200,989.00	-	-							
011567898	Instruct,safe secure biotechnology skill devel low		Untracked	-	50,009.00	-	-							
23456	Manufacture, engineering science,power machine		Untracked	-	200,547.00	-	-							
0552366	Bargaining low manufac, commission standards,		Untracked	-	25,580.00	-	-							
0099636636	Instruct, order legis skill dev,lab just corect lo		Untracked	-	500,006.00	-	-							
05263	Instruc ,indicator defense factor,step,oper,sfet w		Untracked	-	5,200.00	-	-							
023465	Manufacture,cell battery,Solaire panel,		Untracked	-	200,045.00	-	-							
06993	Instruc, drilling,turning ,foun dry, paint , molecu		Untracked	-	69,669.00	-	-							
0099636963	Instruct, low skill devel safe secure policy , Eng		Untracked	-	50,096,996.00	-	-							

09963699	Instruc,court order data notice motion ,low , eng		Untracked	-	500,693.00	-	-							
0072698	Instruct com, visa wehit plate number, fiscality		Untracked	-	258,800.00	-	-							
5000	Research on low voltage distribution network opera		Untracked	-	5,000,000.00	-	-							
200087	Manufacture, instrument measure,control electric		Untracked	-	2,098,987.00	-	-							
0099663663	Instruct,book record sale cust ,exercise book note		Untracked	-	500,063.00	-	-							
002345	Engineering, construction civil,mecanic,const elec		Untracked	-	345,654.00	-	-							
0996396	Instruct, cybersecurity,policy safety database		Untracked	-	2,589,963.00	-	-							
09963696693	Instruct, policy procedure hr award lab, pansion		Untracked	-	50,000.00	-	-							
099636369	Instruct, mediation award variation certificate lo		Untracked	-	500,006.00	-	-							
063233	Instruct, commission electric , bargaining low		Untracked	-	25,366.00	-	-							
09963696396	Instruct, skill develop fund pansion, tenure ,ext		Untracked	-	50,006.00	-	-							
009969859	Instruct ,architect PC ,system data ,build circuit		Untracked	-	15,699,639.00	-	-							
009963663	Instruct, low skill dev safe secure enginee electr		Untracked	-	500,963.00	-	-							
00926959	Instruct, database Unix web mail office		Untracked	-	2,589,636.00	-	-							
0072536	Instruct com,plate fiscal,plate , empower,value		Untracked	-	639,980.00	-	-							
456865	Manufacture, drawing electric ,diagram ,panelcontr		Untracked	-	3,400,000.00	-	-							
2000898	Engineering, construct electric , electromechanic		Untracked	-	239,000.00	-	-							
11000	Engineering trade council quality low criterion qu		Untracked	-	20,000.00	-	-							
003454	Implementation engineering electrical circular tra		Untracked	-	2,223.00	-	-							
0996369	Instruct,, commissair		Untrac	-	50,006.00	-	-							

	conciliation award ruling.lo		ked											
0996366369	Instruct, exercise book completed rerwiten topics		Untracked	-	500,063.00	-	-							
022987	Diplomat engineering national implementation		Untracked	-	40,000.00	-	-							
0996369635	Instruct,order labour insurance,compent, fund low		Untracked	-	50,096.00	-	-							
099639693	Instruct ,court order , granted review labour,		Untracked	-	50,009.00	-	-							
00112345098	Instruct,inspect food take typical info,compos low		Untracked	-	50,000.00	-	-							
056999	056693		Untracked	-	529,996.00	-	-							
000234	Engineering trade council quality low criterion qu	Engineering trade council quality low criterion	Untracked	-	20,000.00	-	-							
06693	Instruct commission mechanic,water hydraulic		Untracked	-	63,399.00	-	-							
30009	Manufacture,electrotech , electrotechnolgy, relate		Untracked	-	209,000.00	-	-							
009925	Instruct , Eng market,libell,barcode thermo, packa		Untracked	-	258,000.00	-	-							
0963696336	Instruct,risk ass book,policy book,record,Manuel s		Untracked	-	50,006,963.00	-	-							
0099985663	Instruct, skill devel casebook exercise book low		Untracked	-	52,699.00	-	-							
2098900	Manufacture, light bulb,switch outlet socket,		Untracked	-	200,989,878.00	-	-							
05200	Training manager system, Quality Assurance	Training manager system, Quality Assurance	Untracked	2,000.00	-	-	-							
099963669	Instruct, order guard court labour record bookepin		Untracked	-	500,069.00	-	-							
099639966	Instruct, booksaler , textbooks reward ,award		Untracked	-	50,006.00	-	-							
00725669	Instruc commis, municipality,visa engine supply		Untracked	-	2,506,690.00	-	-							
0072096	Instruc, bulletin,visa certificate,metering		Untracked	-	2,500.00	-	-							

	city													
20056	Manufacture,didactic educare material electric pan		Untracked	-	3,000,000.00	-	-							
006206	Train trainer instruc ,license certificate build ,	Train trainer instruc ,license certificate build ,	Untracked	20,000.00	-	-	-							
000123	Engineering chemistry, engineering physics, metall		Untracked	-	2,000,000.00	-	-							
09963663693	Instruct, posted office con ARB,low bargaining		Untracked	-	5,000,693.00	-	-							
569000	Instruct commission, science engineering,PHY,che		Untracked	-	56,999.00	-	-							
052996	Instruct,manufac,composite ,watn safe, wire copper		Untracked	-	25,000.00	-	-							
0099636969	Instruct ,order labour court ,record transcript lw		Untracked	-	50,002.00	-	-							
0963669	Instruc,data initial unity central ,logic arithmet		Untracked	-	2,500,693.00	-	-							
00996369669	Instruct, skill devel casebook Portofilio low eng		Untracked	-	56,000.00	-	-							
011235543	Instruct ,health typical info nutrie food value, l		Untracked	-	58,000.00	-	-							
0099056	,instruct ,printer ,scanner wizard database,		Untracked	-	258,906.00	-	-							
09699960	Instruc,data algorithm,arborith , topographic web		Untracked	-	10,000.00	-	-							
00996369696	Instruct ,booking record,control cash book, superb		Untracked	-	5,000,069.00	-	-							
06399	Instruc code, composit AC,DC machine, instrument		Untracked	-	52,000.00	-	-							
09996369	Instruct, close bid award certificate, con media l		Untracked	-	56,399,638.00	-	-							
0092696	Instruct, database treatment text table creat ,		Untracked	-	2,580,996.00	-	-							
234567887	Engineering,construct elect traction electric		Untracked	-	-	-	-							
0996399	Instruct ,court order award ruling , rescission eg		Untracked	-	500,069.00	-	-							
09898	Engineering,mining ,		Untrac	-	209,909.0	-	-							

	maintence, repare, manufactur		ked		0									
0099680	Instruct, financial data fiscal Min max binary		Untracked	-	10,000.00	-	-							
0092963	Instruct,information processing commissair marks		Untracked	-	25,000.00	-	-							
09963996	Instruct ,data commercial low liquid term,note		Untracked	-	25,000.00	-	-							
0996366398	Instruct, order judgement appeal labour low,eng		Untracked	-	500,096.00	-	-							
00996369663	Instruct, pension fund bargaining certificate low		Untracked	-	5,006,936.00	-	-							
009926558	Instruct,databee language machine ,it manufac		Untracked	-	536,999.00	-	-							
0092658	Instruct,code database infographic, move marker		Untracked	-	536,989.00	-	-							
00034	Manufacture measure instrument,AC ,dc	Manufacture measure instrument,AC ,dc	Untracked	200,000.00	-	-	-							
09936639	Instruct, notice setdown register low ,roll		Untracked	-	5,000,693.00	-	-							
06233369	Instruct commission entrepreneurs Elec rules		Untracked	-	60,098.00	-	-							
06623	Instruct commission electrotech genie ruling		Untracked	-	366,936.00	-	-							
099639963	Instruct , delivery servic bill, data market , r		Untracked	-	296,399.00	-	-							
0099963	Instruct,court order certificate outc commissair		Untracked	-	500,003.00	-	-							
052069	training I struct license ,and policy ,safety prod		Untracked	-	25,800.00	-	-							
000346	Manufacture, wire way ,premise ,key switch ways	Manufacture, wire way ,premise ,key switch ways	Untracked	200,000.00	-	-	-							
00113456	Instruct,biomicrobiologi,scanner biochem,low		Untracked	-	50,009.00	-	-							
09	Fit, appliance electrical house home , industrial	Fit, appliance electrical house home ,	Untracked	50,000.00	-	-	-							

		industrial												
200345	Manufacture, AC,DC machine motor,alternator,		Untracked	-	200,000.00	-	-							
005203	Education technology, Implementation syst educu	Education technology, Implementation syst educu	Untracked	20,000.00	-	-	-							
005200	Training, Quality Assurance ,iso commissair	Training, Quality Assurance	Untracked	52,000.00	-	-	-							
06266639	Instruct commission, energie electric engineering		Untracked	-	6,399,965.00	-	-							
062339	Instruct commission electric engineering low,		Untracked	-	62,336.00	-	-							
001126867	Instruct,food medecinal value assessment low,		Untracked	-	5,009,898.00	-	-							
09963663	Instruct,report booking registrar attandance clerk		Untracked	-	526,990.00	-	-							
00996396	Instruct, database display mouse , module monitor		Untracked	-	36,500.00	-	-							
001334	Engineering plastic ,metallurgie, geotechnical		Untracked	-	2,345.00	-	-							
09963996963	Instruct court order, judgement, argument.eng low		Untracked	-	5,000,693.00	-	-							
052963	Edu professional,license handbook buildings		Untracked	-	25,000.00	-	-							

☑

Compact view
Items per page
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1. Reports

Income and Expenses by Contact

-

Xero standard report
Income and Expenses by Contact
Common formats
Expenses by Contact
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Date range: This month

1 Aug 2023

31 Aug 202

Columns
Compare with
Grouping/Summarising

Income and

Tshingombe
For the period 1 August 2023 to 31 August 2023

fiston tshingombe	Expense	-	100,000.00	-	-
mmsale@shoprite.co.za	Income	431,392,131.00	6,283,088,635.00	-	-
mmsale@shoprite.co.za	Income	135,528,914.00	-	-	-
mmsale@shoprite.co.za	Income	1,134,948,513.00	-	-	-
mmsale@shoprite.co.za	Expense	(1,142,668.00)	-	-	-
Tshingombe	Expense	-	(265,236.04)	-	-
tshingombekb@gmail.com	Expense	-	(77,000.00)	-	-
tshingombekb@gmail.com	Expense	678,567.00	-	-	-
Total		1,701,405,457.00	6,282,846,398.96	-	-

1. ts

Income and Expenses by Contact

-

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 Income and Expenses by Contact
  Common formats
 Expenses by Contact
 Income by Contact
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Date range: This month

1 Aug 2023

31 Aug 202

Columns
Compare with
Grouping/Summarising

Income and

Tshingombe
For the period 1 August 2023 to 31 August 2023

fiston tshingombe	Expense	-	100,000.00	-	-
mmsale@shoprite.co.za	Income	431,392,131.00	6,283,088,635.00	-	-
mmsale@shoprite.co.	Incom	135,528,914.0	-	-	-

za	e	0			
mmsale@shoprite.co.za	Income	1,134,948,513.00	-	-	-
mmsale@shoprite.co.za	Expense	(1,142,668.00)	-	-	-
Tshingombe	Expense	-	(265,236.04)	-	-
tshingombekb@gmail.com	Expense	-	(77,000.00)	-	-
tshingombekb@gmail.com	Expense	678,567.00	-	-	-
Total		1,701,405,457.00	6,282,846,398.96	-	-

1.

General Ledger Summary

Accounts

54 Accounts

Date range: This month

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Columns

General Led

Tshingombe
For the period 1 August 2023 to 31 August 2023

Accounts Payable	800	774,352.05	1,318,118.34	(543,766.29)	Current Liability
Accounts Receivable	610	7,165,903,771.80	5,209,070,278.45	1,956,833,493.35	Current Asset
Advertising	400	-	209,898,765.00	(209,898,765.00)	Expense
Cleaning	408	419,978.00	629,967.00	(209,989.00)	Expense
Consulting & Accounting	412	4,083,046,421.00	4,297,481,879.00	(214,435,458.00)	Expense
Historical Adjustment	840	2,578,987.00	2,578,987.00	-	Current Liability
Insurance	433	445,598.00	891,196.00	(445,598.00)	Expense
Interest Expense	437	40,000.00	20,000.00	20,000.00	Expense
Interest Income	270	40,000.00	30,000.00	10,000.00	Revenue
Light, Power, Heating	445	400,989.00	601,978.00	(200,989.00)	Expense
Motor Vehicle Expenses	449	200,547.00	200,547.00	-	Expense
Office Equipment	710	9,380.00	11,725.00	(2,345.00)	Fixed Asset
Office Expenses	453	4,000,000.00	6,000,000.00	(2,000,000.00)	Expense
Other Revenue	260	1,062,668.00	1,271,095,994.00	(1,270,033,326.00)	Revenue

Retained Earnings	960	6,299,967.00	8,399,956.00	(2,099,989.00)	Equity
Sales	200	-	10,000.00	(10,000.00)	Revenue
Telephone & Internet	489	2,098,998.00	4,197,996.00	(2,098,998.00)	Expense
Unrealised Currency Gains	498	16,050.14	-	16,050.14	Expense
VAT	820	613,842,686.85	868,743,007.05	(254,900,320.20)	Current Liability
Total		11,881,180,393.84	11,881,180,393.84	-	

☑

Compact view
Showing items 1-20 of 20

1 Aug 2023

31 Aug 202

Columns
Grouping/Summarising

General Led

Tshingombe
For the period 1 August 2023 to 31 August 2023

Consulting & Accounting																
1 Aug 2023	Receivable Credit Note	Higher than average	mmsale@shoprite.co.za - Manufacture, control logic , engineering fund,syst	200	3,450,008,767.00	-	15.00%	412								
1 Aug 2023	Receivable Invoice	Higher than average	mmsale@shoprite.co.za - Manufacture, control logic , engineering fund,syst	200	-	3,450,008,767.00	15.00%	412								
Total Consulting & Accounting					3,450,008,767.00	3,450,008,767.00										
Net movement					-	-										
Other Revenue																
9 Aug 2023	Receivable Invoice	Higher than average	mmsale@shoprite.co.za - 0099636633	25600	-	996,636,996.00	15.00%	260								
Total Other Revenue					-	996,636,996.00										
Net move					-	996,636,996.00										

ment																
Total					3,450,008,767.00	4,446,645,763.00										

1. Reports

General Ledger Detail

-

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Accounts
54 Accounts
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General Led
Tshingombe
For the period 1 August 2023 to 31 August 2023

Accounts Payable																		
3 Aug 2023	Payable Credit Note	tshingombekb@gmail.com	2000	774,352.05	-	774,352.05	-	0.00%										
3 Aug 2023	Payable Invoice	mmsale@shoprite.co.za	2089	-	651,034.10	123,317.95	-	0.00%										
3 Aug 2023	Payable Invoice	mmsale@shoprite.co.za	2089	-	651,034.10	(527,716.15)	-	0.00%										
31 Aug 2023		Currency Adjustment		-	16,050.14	(543,766.29)	-	0.00%										
Total Accounts Payable				774,352.05	1,318,118.34	(543,766.29)	-											
Net moveme				-	543,766.29	-	-											

nt																		
Accounts Receivable																		
1 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za	400	495,785,952.30	-	495,785,952.30	-	0.00%										
1 Aug 2023	Receivable Credit Note	mmsale@shoprite.co.za	200	-	4,217,298,024.85	(3,721,512,072.55)	-	0.00%										
1 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za	200	4,217,298,024.85	-	495,785,952.30	-	0.00%										
2 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za	20349	495,886,126.80	-	991,672,079.10	-	0.00%										
2 Aug 2023	Receivable Credit Note	mmsale@shoprite.co.za	20349	-	495,886,126.80	495,785,952.30	-	0.00%										
2 Aug 2023	Receivable Credit Note Allocation	mmsale@shoprite.co.za	20349	-	495,886,126.80	(100,174.50)	-	0.00%										
2 Aug 2023	Receivable Credit Note Allocation	mmsale@shoprite.co.za	20349	495,886,126.80	-	495,785,952.30	-	0.00%										
3 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za	2500	1,360,532.80	-	497,146,485.10	-	0.00%										
5 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za	,2569	10,125,676.40	-	507,272,161.50	-	0.00%										

5 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za	58900	8,119,133.40	-	515,391,294.90	-	0.00%										
6 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za	25880	115,103.50	-	515,506,398.40	-	0.00%										
6 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za	2500	26,268,387.40	-	541,774,785.80	-	0.00%										
7 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za	5269	50,192,329.20	-	591,967,115.00	-	0.00%										
7 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za	INV-0036	2,530,983.25	-	594,498,098.25	-	0.00%										
9 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za	25600	1,206,477,144.00	-	1,800,975,242.25	-	0.00%										
10 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za	63369	66,774,901.80	-	1,867,750,144.05	-	0.00%										
11 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za	500	21,354,191.30	-	1,889,104,335.35	-	0.00%										
11 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za	54799	67,729,158.00	-	1,956,833,493.35	-	0.00%										
Total Accounts Receivable				7,165,903,771.80	5,209,070,278.45	1,956,833,493.35	-											
Net movement				1,956,833,493.35	-	-	-											
Advertising																		
1 Aug 202	Receivable	mmsale@shoprite.co.za -	400	-	209,898,765.00	(209,898,765.00)	(31,484,814.75)	15.00%	Standard									

3	Invoice	Engineering,quality survey ,geomatic							Rate Purchases									
Total Advertising				-	209,898,765.00	(209,898,765.00)	(31,484,814.75)											
Net movement				-	209,898,765.00	-	-											
Cleaning																		
1 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering, artisan,clot ,logistic, operational m	400	-	209,989.00	(209,989.00)	(31,498.35)	15.00%	Standard Rate Purchases									
1 Aug 2023	Receivable Credit Note	mmsale@shoprite.co.za - Engineering, artisan,clot ,logistic, operational m	200	209,989.00	-	-	31,498.35	15.00%	Standard Rate Purchases									
1 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering, artisan,clot ,logistic, operational m	200	-	209,989.00	(209,989.00)	(31,498.35)	15.00%	Standard Rate Purchases									
2 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering, artisan,clot ,logistic, operational m	20349	-	209,989.00	(419,978.00)	(31,498.35)	15.00%	Standard Rate Purchases									
2 Aug 2023	Receivable Credit Note	mmsale@shoprite.co.za - Engineering, artisan,clot ,logistic, operational m	20349	209,989.00	-	(209,989.00)	31,498.35	15.00%	Standard Rate Purchases									
Tota				419,97	629,96	(209,98	(31,49											

l Cleaning				8.00	7.00	9.00)	8.35)											
Net movement				-	209,989.00	-	-											
Consulting & Accounting																		
1 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering elect, electrotech ,load EIC,norm symb	400	-	200,898.00	(200,898.00)	(30,134.70)	15.00%	Standard Rate Purchases									
1 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering, construct electric , electromechanic	400	-	239,000.00	(439,898.00)	(35,850.00)	15.00%	Standard Rate Purchases									
1 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering,construct elect,substation,station ele	400	-	2,000,989.00	(2,440,887.00)	(300,148.35)	15.00%	Standard Rate Purchases									
1 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering,Elec ,electro static load ,dynamic , ki	400	-	2,345,999.00	(4,786,886.00)	(351,899.85)	15.00%	Standard Rate Purchases									
1 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering,Elec , electromagnetic,AC, DC load	400	-	209,099,878.00	(213,886,764.00)	(31,364,981.70)	15.00%	Standard Rate Purchases									
1 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering, construction civil,mecanic,const	400	-	345,654.00	(214,232,418.00)	(51,848.10)	15.00%	Standard Rate Purchases									

		elec																
1 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering build ,mecanic, electric support	400	-	203,040.00	(214,435,458.00)	(30,456.00)	15.00%	Standard Rate Purchases									
1 Aug 2023	Receivable Credit Note	mmsale@shoprite.co.za - Engineering,Elec , electromagnetic,AC, DC load	200	209,099,878.00	-	(5,335,580.00)	31,364,981.70	15.00%	Standard Rate Purchases									
1 Aug 2023	Receivable Credit Note	mmsale@shoprite.co.za - Engineering elect, electrotech ,load EIC,norm symb	200	200,898.00	-	(5,134,682.00)	30,134.70	15.00%	Standard Rate Purchases									
1 Aug 2023	Receivable Credit Note	mmsale@shoprite.co.za - Engineering elect, electrotech ,load EIC,norm symb	200	200,898.00	-	(4,933,784.00)	30,134.70	15.00%	Standard Rate Purchases									
1 Aug 2023	Receivable Credit Note	mmsale@shoprite.co.za - Engineering, construction civil,mecanic,const elec	200	345,654.00	-	(4,588,130.00)	51,848.10	15.00%	Standard Rate Purchases									
1 Aug 2023	Receivable Credit Note	mmsale@shoprite.co.za - Engineering, construct electric , electromechanic	200	239,000.00	-	(4,349,130.00)	35,850.00	15.00%	Standard Rate Purchases									
1 Aug 2023	Receivable Credit Not	mmsale@shoprite.co.za - Manufacture,control logic ,	200	3,450,008,767.00	-	3,445,659,637.00	517,501,315.05	15.00%	Standard Rate Pur									

	e	engineering fund,syst							chases									
1 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering,Elec , electromagnetic,AC, DC load	200	-	209,099,878.00	3,236,559,759.00	(31,364,981.70)	15.00%	Standard Rate Purchases									
1 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering elect, electrotech ,load EIC,norm symb	200	-	200,898.00	3,236,358,861.00	(30,134.70)	15.00%	Standard Rate Purchases									
1 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering elect, electrotech ,load EIC,norm symb	200	-	200,898.00	3,236,157,963.00	(30,134.70)	15.00%	Standard Rate Purchases									
1 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering, construction civil,mecanic,const elec	200	-	345,654.00	3,235,812,309.00	(51,848.10)	15.00%	Standard Rate Purchases									
1 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering, construct electric , electromechanic	200	-	239,000.00	3,235,573,309.00	(35,850.00)	15.00%	Standard Rate Purchases									
1 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Manufacture,control logic , engineering fund,syst	200	-	3,450,008,767.00	(214,435,458.00)	(517,501,315.05)	15.00%	Standard Rate Purchases									
2 Aug 2023	Receivable Invo	mmsale@shoprite.co.za - Engineeri	20349	-	203,040.00	(214,638,498.00)	(30,456.00)	15.00%	Standard Rat									

	ice	ng build ,mecanic, electric support							e Purchases									
2 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering,Elec , electromagnetic,AC, DC load	20349	-	209,099,878.00	(423,738,376.00)	(31,364,981.70)	15.00%	Standard Rate Purchases									
2 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering,Elec , electromagnetic,AC, DC load	20349	-	209,099,878.00	(632,838,254.00)	(31,364,981.70)	15.00%	Standard Rate Purchases									
2 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering,construct elect,substation,station ele	20349	-	2,000,989.00	(634,839,243.00)	(300,148.35)	15.00%	Standard Rate Purchases									
2 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering,construct elect,substation,station ele	20349	-	2,000,989.00	(636,840,232.00)	(300,148.35)	15.00%	Standard Rate Purchases									
2 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering, construction civil,mecanic,const elec	20349	-	345,654.00	(637,185,886.00)	(51,848.10)	15.00%	Standard Rate Purchases									
2 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering elect, electrotech ,load EIC,norm symb	20349	-	200,898.00	(637,386,784.00)	(30,134.70)	15.00%	Standard Rate Purchases									
2 Aug 202	Receivable	mmsale@shoprite.co.za -	20349	203,040.00	-	(637,183,744.00)	30,456.00	15.00%	Standard									

3	Credit Note	Engineering build ,mecanic, electric support							Rate Purchases									
2 Aug 2023	Receivable Credit Note	mmsale@shoprite.co.za - Engineering,Elec , electromagnetic,AC, DC load	20349	209,099,878.00	-	(428,083,866.00)	31,364,981.70	15.00 %	Standard Rate Purchases									
2 Aug 2023	Receivable Credit Note	mmsale@shoprite.co.za - Engineering,Elec , electromagnetic,AC, DC load	20349	209,099,878.00	-	(218,983,988.00)	31,364,981.70	15.00 %	Standard Rate Purchases									
2 Aug 2023	Receivable Credit Note	mmsale@shoprite.co.za - Engineering,construct elect,substation,station ele	20349	2,000,989.00	-	(216,982,999.00)	300,148.35	15.00 %	Standard Rate Purchases									
2 Aug 2023	Receivable Credit Note	mmsale@shoprite.co.za - Engineering,construct elect,substation,station ele	20349	2,000,989.00	-	(214,982,010.00)	300,148.35	15.00 %	Standard Rate Purchases									
2 Aug 2023	Receivable Credit Note	mmsale@shoprite.co.za - Engineering, construction civil,mecanic,const elec	20349	345,654.00	-	(214,636,356.00)	51,848.10	15.00 %	Standard Rate Purchases									
2 Aug 2023	Receivable Credit Note	mmsale@shoprite.co.za - Engineering elect, electrotech ,load EIC,norm symb	20349	200,898.00	-	(214,435,458.00)	30,134.70	15.00 %	Standard Rate Purchases									
Total				4,083,046,42	4,297,481,87	(214,435,458.0	(32,165,318.											

Consulting & Accounting				1.00	9.00	0)	70)											
Net movement				-	214,435,458.00	-	-											
Historical Adjustment																		
1 Aug 2023	Receivable Credit Note	mmsale@shoprite.co.za - Manufacture, mathematics engineering funct	200	2,578,987.00	-	2,578,987.00	-	0.00%	No VAT									
1 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Manufacture, mathematics engineering funct	200	-	2,578,987.00	-	-	0.00%	No VAT									
Total Historical Adjustment				2,578,987.00	2,578,987.00	-	-											
Net movement				-	-	-	-											
Insurance																		
1 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering,gov social municipality metering energ	400	-	235,689.00	(235,689.00)	(35,353.35)	15.00%	Standard Rate Purchases									
1 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering,mining , maintence , repare,	400	-	209,909.00	(445,598.00)	(31,486.35)	15.00%	Standard Rate Purchases									

		manufactur																
1 Aug 2023	Receivable Credit Note	mmsale@shoprite.co.za - Engineering,gov social municipality metering energ	200	235,689.00	-	(209,909.00)	35,353.35	15.00%	Standard Rate Purchases									
1 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering,gov social municipality metering energ	200	-	235,689.00	(445,598.00)	(35,353.35)	15.00%	Standard Rate Purchases									
2 Aug 2023	Receivable Invoice	mmsale@shoprite.co.za - Engineering,mining , maintence, repare, manufactur	20349	-	209,909.00	(655,507.00)	(31,486.35)	15.00%	Standard Rate Purchases									
2 Aug 2023	Receivable Credit Note	mmsale@shoprite.co.za - Engineering,mining , maintence, repare, manufactur	20349	209,909.00	-	(445,598.00)	31,486.35	15.00%	Standard Rate Purchases									
Total Insurance				445,598.00	891,196.00	(445,598.00)	(66,839.70)											
Net movement				-	445,598.00	-	-											
Interest Expense																		
3 Aug 2023	Payable Credit Note	tshingombekb@gmail.com - Education technology, Implementation syst educu	2000	-	20,000.00	(20,000.00)	-	0.00%	No VAT									

3 Aug 2023	Payable Invoice	mmsale@shoprite.co.za - Education technology, Implementation syst educu	2089	20,000.00	-	-	-	0.00%	No VAT									
3 Aug 2023	Payable Invoice	mmsale@shoprite.co.za - Education technology, Implementation syst educu	2089	20,000.00	-	20,000.00	-	0.00%	No VAT									
Total Interest Expense				40,000.00	20,000.00	20,000.00	-											
Net movement				20,000.00	-	-	-											
Interest Income																		
3 Aug 2023	Payable Credit Note	tshingombekb@gmail.com - Train trainer instruc ,license certificate build ,	2000	-	20,000.00	(20,000.00)	-	0.00%	No VAT									
3 Aug 2023	Payable Invoice	mmsale@shoprite.co.za - Train trainer instruc ,license certificate build ,	2089	20,000.00	-	-	-	0.00%	No VAT									
3 Aug 2023	Payable Invoice	mmsale@shoprite.co.za - Train trainer instruc ,license certificate build ,	2089	20,000.00	-	20,000.00	-	0.00%	No VAT									

Reports ›

Foreign Currency Gains and Losses

- 1. Gains and losses are calculated as the gain (loss) that occurred during the period (or YTD), not the total gain (loss) as at 31 August 2023

- 2. Realised gains (losses) result from payments and credits being made to invoices with a different exchange rate
- 3. Unrealised gains (losses) result from the amount due on invoices increasing or decreasing due to exchange rates changing
- 4. FX Exposure is the total unrealised gain (loss) as at 31 August 2023
- 5. Negative realised and unrealised gains are an expense
- 6. Read more about this report

From:

To:

Update

Foreign Currency Gains and Losses
Tshingombe
From 1 August 2023 to 31 August 2023

	Balance		Balance ZAR	Realised Gain	Unrealised Gain	Realised Gain YTD	Unrealised Gain YTD	FX Exposure
Accounts Receivable								
South African Rand	9,129,789,627.15	ZAR	9,129,789,627.15	0.00	0.00	0.00	0.00	0.00
Total Accounts Receivable			9,129,789,627.15	0.00	0.00	0.00	0.00	0.00
Accounts Payable								
United States Dollar	15,000.00	USD	284,136.11[1]	0.00	(16,050.14)	0.00	(18,900.07)	(18,900.07)
South African Rand	515,666.15	ZAR	515,666.15	0.00	0.00	0.00	0.00	0.00
Total Accounts Payable			799,802.26	0.00	(16,050.14)	0.00	(18,900.07)	(18,900.07)
Total Gain (Loss)				0.00	(16,050.14)	0.00	(18,900.07)	(18,900.07)
FX Exposure								(18,900.07)

This report uses the most up-to-date exchange rate data available to convert foreign currencies into South African Rand. Enter exchange rates for 31 August 2023.

Notes

1.
Figures converted into South African Rand using the following rate:

0.0527916 USD United States Dollar per ZAR. Rate provided by XE.com on 13 Aug 2023.

1. ports

Fixed Asset Reconciliation

Date range: Last financial year
1 Jan 2022
31 Dec 2022
Columns
Fixed Asset
Tshingombe
For the year ended 31 December 2022

Total
Difference - - - - - -

1. eports

Expense Claim Detail

Date: End of this month
31 Aug 2023
Ageing Periods
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Expense Cla
Tshingombe
As at 31 August 2023

1.

Executive Summary

Date range: This month
1 Aug 2023
31 Aug 2023
Compare with
Executive S
Tshingombe
For the month ended 31 August 2023

Cash
Cash - - -

received			
Cash spent	-	-	-
Cash surplus (deficit)	-	-	-
Closing bank balance	-	-	-
Profitability			
Income	1,270,033,326.00	-	-
Direct costs	-	-	-
Gross profit (loss)	1,270,033,326.00	-	-
Other income	-	-	-
Expenses	(429,253,746.86)	(5,900,208,907.02)	92.72%
Profit (loss)	1,699,287,072.86	5,900,208,907.02	-71.20%
Balance Sheet			
Debtors	9,129,789,627.15	7,172,956,133.80	27.28%
Creditors	799,802.26	256,035.97	212.38%
Net assets	7,601,595,968.88	5,900,208,907.02	28.84%
Sales			
Number of invoices issued	14.00	6.00	133.33%
Average value of invoices	121,562,111.29	1,047,181,439.17	-88.39%
Performance			
Gross profit margin (%)	100.00	-	-

Net profit margin (%)	133.80	-	-
Return on investment (p.a.) (%)	268.25	1,200.00	-77.65%
Position			
Average debtor days	222.85	-	-
Average creditor days	-	-	-
Short term cash forecast	9,128,989,824.89	7,172,700,097.83	27.27%
Current assets to liabilities	6.11	5.79	5.52%
Term assets to liabilities	-	-	-

1. Reports

Duplicate Statement Lines

Accounts

Date range: Last month
1 Jul 2023
31 Jul 2023
Columns
Duplicate St
Tshingombe
For the period 1 July 2023 to 31 July 2023
Reports

1. Custom

Disposal Schedule

Date range: This financial year
1 Jan 2023
31 Dec 202
Columns
Grouping/Summarising
Disposal Sc
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- Docs »
- Structures de données
- View page source

Structures de données

Note

Le type Struct proposé dans ce cours n'est pas standard en Python. Il a été programmé pour les besoins du cours, notamment pour approcher de manière progressive la notion de classe, qui sera abordée dans la deuxième partie du cours.

Une structure est un ensemble non ordonné de valeurs ayant potentiellement des types différents. Les valeurs que contient la structure sont appelées ses *champs*, et sont identifiés par un nom.

Un type de structure (ou type de données structuré) spécifie un ensemble de champs (leur nom et leur type).

Pré-requis

Afin d'utiliser les structures en Python, il est nécessaire :

- de télécharger le module algo.py à l'adresse http://champin.net/2012/algo.py

- d'inclure la ligne suivante dans tous les programmes utilisant les structures :
- from algo import Struct

Déclaration d'un type de structure

Pour déclarer un type de structure, on utilisera une déclaration de la forme suivante :

- première ligne :
    - le mot-clé class,
    - le nom du nouveau type,
    - le texte (Struct),
    - le caractère *deux points* (:).
- lignes suivantes (indentées par rapport à la première)
    - le nom d'un champ
    - le caractère =
    - le nom du type associé à ce champ

Par exemple :

```
from algo import Struct

class Date(Struct):
    année=int
    mois=int
    jour=int

class Lieu(Struct):
    nom=str
    long=float
    lat=float
```

Notons que les champs d'une structure peuvent avoir eux même un type structuré :

```
class Personne(Struct):
    nom=str
    naissance=Date
```

Déclaration d'une structure

Une fois déclarés un ou plusieurs types structurés, il est possible de créer une donnée correspondant à un de ces types ainsi :

- le nom du type
- une parenthèse ouvrante (
- une liste de valeurs pour les champs, sous la forme nom=valeur, et séparées par des virgules,

- une parenthèse fermante).

NB: l'ordre des champs n'a pas d'influence.

Par exemple :

```
>>> d = Date(jour=23, mois=6, année=1912)
>>> p = Personne(nom="Alan Turing", naissance=d)
```

Opérations sur les structures

Les seules opérations sur les structures consistent en la lecture et la modification de leurs champs, en utilisant la « notation pointée » : on accède au champ en indiquant le nom de la structure, suivi d'un point, suivi du nom du champ :

```
>>> p.nom
'Alan Turin'
>>> p.d
Date(jour=22, mois=6, année=1912)
>>> p.nom = "Alan Turing"  # modification d'un champ
>>> p.nom
'Alan Turing'
```

Dans le cas où un champ contient lui même une structure, on peut enchaîner plusieurs notations pointées :

```
>>> p.naissance.année
1912
>>> p.naissance.jour = 23
```

Notons enfin que, comme les tableaux, les structures sont des objets mutables. Lorsque deux variables font référence à la même structure, les modifications sur l'une des variables sont donc répercutées sur l'autre :

```
>>> alan = p
>>> alan.nom
'Alan Turing'
>>> alan.nom = "Alan M. Turing"
>>> p.nom  # le changement sur alan est également visible sur p
'Alan M. Turing'
```

Comparaison de structures

Les structures peuvent être comparées avec les opérateurs == et !=, mais attention : ces opérateurs ne comparent que l'*identité* des structures. Deux structures créées indépendamment seront toujours considérées comme différentes, mêmes si leurs champs sont tous égaux :

```
>>> d1 = Date(jour=1, mois=1, année=1970)
>>> d2 = Date(jour=1, mois=1, année=1970)
>>> d1 == d2
False
```

La raison en est que l'*équivalence* de deux structures dépend de la sémantique de ses champs. Ainsi, deux personnes ayant le même nom et la même date de naissance ne sont pas forcément la même personne. Inversement, on peut avoir un type structuré dont deux structures ayant des valeurs de champs différentes représenteraient néanmoins le même objet, par exemple :

```
class Droite(Struct):
    a=float
    b=float
    c=float
    # représente la droite
    # d'équation ax + by + c = 0
```

Pour tester l'équivalence entre deux structures du même type, il convient donc d'écrire une fonction *spécifique* qui tiennent compte de la sémantique particulière des champs.

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Sun, Sep 17, 2023 at 12:38 PM

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Espace topologique

axiomatique minimale permettant de traiter des notions de limite, de continuité, et de voisinage

- Langue
- Suivre
- Modifier

La **topologie générale** est une branche des mathématiques qui fournit un vocabulaire et un cadre général pour traiter des notions de limite, de continuité, et de voisinage.

Les **espaces topologiques** forment le socle conceptuel permettant de définir ces notions. Elles sont suffisamment générales pour s'appliquer à un grand nombre de situations différentes : ensembles finis, ensembles discrets, espaces de la géométrie euclidienne, espaces numériques à *n* dimensions, espaces fonctionnels plus complexes, mais aussi en géométrie algébrique. Ces concepts apparaissent dans presque toutes les branches des mathématiques ; ils sont donc centraux dans la vision moderne des mathématiques.

La topologie générale ne tente pas d'élucider la question très complexe de la « composition du continu » : elle part d'une approche axiomatique, en utilisant le vocabulaire de la théorie des ensembles ; autrement dit, elle suit une approche fondée sur la notion de structure (en l'occurrence, ici, une structure topologique), en faisant usage d'une axiomatique ensembliste. Les axiomes sont minimaux, et en ce sens, c'est la structure la plus générale pour étudier les concepts cités.

La topologie générale définit le vocabulaire fondamental, mais permet aussi la démonstration de résultats non triviaux et puissants, tels que le théorème de Baire. Elle possède deux prolongements importants, permettant une analyse plus approfondie encore de la notion générale de « forme » : la topologie différentielle, généralisant les outils de l'analyse classique (dérivée, champs de vecteurs, etc.) et la topologie algébrique, introduisant des invariants calculables tels que les groupes d'homologie.

Cet article est technique ; une vision générale et historique est ébauchée dans l'article « Topologie ».

Sommaire

Définitions Modifier

Deux définitions équivalentes sont souvent données : la définition par les ouverts, et la définition par les voisinages d'un point. La première est plus ramassée, la seconde souvent plus intuitive. Le passage d'une définition à l'autre est direct.

Définition par les ouverts Modifier

Un espace topologique est un couple (E, $\mathcal{T}$), où E est un ensemble et $\mathcal{T}$ une topologie sur E, à savoir un ensemble de parties de E — que l'on appelle les ouverts de (E, $\mathcal{T}$) — vérifiant les propriétés suivantes :

1. l'ensemble vide et E appartiennent à $\mathcal{T}$[note 1] ;
2. toute réunion *quelconque* d'ouverts est un ouvert, c'est-à-dire que si $(O_i)_{i\in I}$ est une famille

d'éléments de T, indexée par un ensemble I quelconque (pas nécessairement fini, ni même dénombrable) alors

;

3. toute intersection *finie* d'ouverts est un ouvert, c'est-à-dire que si O_1, … , O_n sont des éléments de T alors

Un *fermé* d'une topologie est défini comme le complémentaire d'un ouvert.

L'*adhérence* X d'une partie X de E est le plus petit fermé qui contient X.

Pour un point *a* de E, on appelle alors *voisinage* de *a* pour cette topologie n'importe quelle partie de E qui inclut un ouvert qui contient *a*.

Définition par les fermés Modifier

Il résulte de la théorie élémentaire des ensembles qu'une topologie sur E peut aussi être définie par l'ensemble de ses fermés, cet ensemble de parties de E devant vérifier :

1. les ensembles E et vide sont des fermés ;
2. toute intersection *quelconque* de fermés est un fermé ;
3. toute réunion *finie* de fermés est un fermé.

Définition par les adhérences Modifier

Dans un espace topologique, les adhérences vérifient les propriétés :

.

Inversement, étant donné un ensemble E, toute application de l'ensemble $P(E)$ des parties de E dans lui-même qui vérifie ces quatre propriétés (appelées *axiomes de fermeture de Kuratowski*) permet de définir sur E une topologie dont est l'application adhérence[1], en décrétant que les fermés de cette topologie sont les X tels que $X = X$.

En effet, les axiomes 1 et 3 de la définition par les fermés ci-dessus sont alors trivialement satisfaits, et l'axiome 2 l'est aussi car l'application est un opérateur de préclôture donc croissant, ce qui permet de montrer que l'intersection X de toute famille de fermés X_i est fermée : pour tout i, de $X \subset X_i$ on déduit $X \subset X_i = X_i$, d'où l'inclusion de X dans X et donc l'égalité. Ainsi, on a défini une topologie, dont est bien l'application adhérence (d'après la croissance et le deuxième axiome de Kuratowski).

Par ailleurs, les axiomes de fermeture de Kuratowski sont équivalents à[2],[3] :

.

Définir une topologie par une application adhérence revient[4],[note 2] à se donner une relation « adhère à » entre les points de E et ses parties, telle que, pour tout *a* de E et toutes parties X, Y de E,

1. aucun élément de E n'adhère à l'ensemble vide,

2. tout élément de X adhère à X,
3. si a adhère à $X \cup Y$ alors a adhère à X ou à Y,
4. si a adhère à X et si tout élément de X adhère à Y, alors a adhère à Y.

Définition par les voisinages Modifier

Article détaillé : Topologie définie à partir des voisinages.

Un espace topologique est un couple , où E est un ensemble et une application de E vers l'ensemble $P(P(E))$ obéissant aux cinq conditions ci-après[note 3], dans lesquelles les éléments de , pour $a \in E$, sont appelés « voisinages de a », la justification de cette appellation venant juste après cette liste.

Pour tout point a de E :

1. tout sur-ensemble d'un voisinage de a est lui-même voisinage de a ;
2. l'intersection de deux voisinages de a est elle-même un voisinage de a ;
3. E est un voisinage de a ;
4. tout voisinage de a contient a ;
5. pour tout voisinage V de a, il existe un voisinage W de a tel que V soit voisinage de chacun des points de W[note 4].

Il existe alors une et une seule topologie sur E (au sens de la définition ci-dessus par les ouverts) telle que pour tout point a de E, soit égal à l'ensemble des voisinages de a pour cette topologie, c'est-à-dire à l'ensemble des parties de E incluant un ouvert qui contient a.

Les ouverts de cette topologie sont les parties O de E telles que pour tout point a de O, O appartienne à

La plupart des notions de topologie, comme la continuité ou la limite, peuvent se définir de manière équivalente et aussi élégante par les ouverts, par les fermés ou par les voisinages.

Exemples Modifier

- Le premier exemple historique d'espace topologique est l'ensemble ℝ des nombres réels muni de sa topologie usuelle. Cet exemple est celui qui est à la base de la théorie des espaces topologiques.
- La topologie induite sur une partie F d'un espace topologique E est la topologie sur F dont les ouverts sont les intersections des ouverts de E avec F. Cette définition permet par exemple de définir la topologie induite par celle de ℝ sur un intervalle, et ainsi de pouvoir définir les propriétés de continuité et de limite à des fonctions définies sur un intervalle de ℝ. L'ensemble de Cantor, source de nombreux exemples et contre-exemples, est un sous-ensemble particulier de ℝ, muni de la topologie induite.
- Il existe une topologie associée à tout espace métrique : ses ouverts sont les réunions de boules ouvertes.
    - Ainsi, la topologie sur ℝ est naturellement issue de la distance issue de la valeur absolue. Un ouvert est alors une union d'intervalles ouverts.
    - Plus généralement, les espaces vectoriels normés sont des espaces métriques donc topologiques.
- Tout ensemble totalement ordonné peut être muni de topologies liées à l'ordre. La plus commune s'appelle la topologie de l'ordre. Sur ℝ, elle coïncide avec la topologie usuelle.
- D'autres exemples de topologies plus sophistiquées sont donnés dans le § « Exemples » de l'article sur les voisinages.
- La donnée d'un espace topologique fini (en) équivaut à celle d'un ensemble fini E et d'un sous-treillis de $P(E)$ contenant ∅ et E.
- La topologie discrète sur un ensemble X est celle pour laquelle $T = P(X)$, l'ensemble des

parties de X. Autrement dit : toutes les parties sont ouvertes, ou encore : tous les points sont isolés. C'est la topologie la plus fine sur X.
- La topologie grossière sur X est la moins fine. C'est celle dont les seuls ouverts sont la partie vide et X lui-même.
- Sur l'ensemble vide et sur les singletons, il n'y a qu'une topologie (à la fois discrète et grossière).
- La topologie cofinie sur X est celle dont les ouverts sont la partie vide et les complémentaires d'ensembles finis. De même, la topologie codénombrable sur X a pour ouverts la partie vide et les complémentaires d'ensembles au plus dénombrables.
- La topologie produit est une topologie définie sur un produit cartésien d'espaces topologiques. Lorsque tous ces espaces sont identiques, on obtient la topologie de la convergence simple. La topologie d'un espace vectoriel réel de dimension finie, vu comme produit fini, coïncide avec celle issue d'une norme. Un exemple de produit infini est le cube de Hilbert $[0, 1]^{\mathbb{N}}$, généralisation du cube en dimension infinie.
- En géométrie algébrique, on définit la topologie de Zariski sur divers espaces. Par exemple :
    - Si k est un corps, la topologie de Zariski sur l'espace affine k^n est celle dont les fermés sont tous les ensembles algébriques affines de k^n. Pour $n = 1$, ces fermés sont simplement k et ses parties finies, donc la topologie de Zariski sur la droite affine est la topologie cofinie.
    - Si A est un anneau commutatif unitaire, son spectre premier, constitué de ses idéaux premiers, est lui aussi muni d'une topologie de Zariski, qui n'est presque jamais séparée.
    - Dans la théorie des schémas, on adopte une définition plus abstraite : les ouverts d'une topologie de Grothendieck (par exemple la topologie étale) sont définis comme des morphismes de certaines catégories.
- Certaines structures algébriques sont munies d'une topologie « compatible » : espaces vectoriels topologiques (souvent localement convexes, comme les espaces de Fréchet), groupes topologiques, anneaux topologiques, etc.

Concepts associés Modifier

Topologie engendrée par une famille de parties Modifier

Article détaillé : Prébase.

Applications continues Modifier

Article détaillé : Continuité.

Définitions Modifier

Un des premiers intérêts de la notion d'espace topologique est de pouvoir définir la continuité des applications. Il existe deux approches, l'approche locale qui définit la continuité en un point, et l'approche globale qui définit la continuité en tout point. Soit $f : E \to F$ une application entre deux espaces topologiques.

- **Définition locale**. Soit a un élément de E. L'application f est dite continue au point a si l'image réciproque de tout voisinage de $f(a)$ est un voisinage de a.
- **Définition globale**. L'application f est dite continue si l'image réciproque $f^{-1}(U)$ de tout ouvert U de F est un ouvert de E.
(Il existe des définitions équivalentes, en termes de fermés ou d'adhérences.)
- **Équivalence de la continuité en tout point et de la continuité globale** : l'application f est continue si et seulement si elle est continue en tout point de E.

Les applications continues sont les morphismes de la catégorie des espaces topologiques. Les isomorphismes de cette catégorie sont appelés les homéomorphismes. Ce sont les bijections continues dont la réciproque est continue.

Topologie engendrée par une famille de fonctions Modifier

Articles détaillés : Comparaison de topologies, Topologie initiale et Topologie finale.

Soient X un ensemble et Y un espace topologique. La donnée supplémentaire d'une application permet de définir une topologie sur X :

- pour toute application f de X dans Y, on peut définir la topologie initiale liée à f. C'est la topologie sur X la plus grossière rendant f continue.
- de même, pour toute application f de Y dans X, on définit la topologie finale liée à f. C'est la topologie sur X la plus fine rendant f continue. Un exemple est la topologie quotient, lorsque X est le quotient de Y par une relation d'équivalence et f la projection canonique.

On peut généraliser ces deux définitions en remplaçant l'espace Y par une famille d'espaces $(Y_i)_{i\in I}$, et l'application f par une famille d'applications $(f_i)_{i\in I}$.

Limites Modifier

Article détaillé : Limite dans les espaces topologiques.

La notion de limite en un point, si elle existe, décrit le comportement qu'une fonction « devrait avoir » si elle était définie en ce point.

Soient E et F deux espaces topologiques, A une partie de E, f une application de A dans F, a un point de E adhérent à A et ℓ un point de F. On dit que ℓ est *une limite* de f au point a si pour tout voisinage V de ℓ, il existe un voisinage W de a tel que pour tout point x de $W\cap A$, l'image $f(x)$ appartient à V.

Remarques

- Si F est séparé alors f possède au plus une limite au point a.
- Si le point a est élément de la partie A, alors f est continue en a si et seulement si $f(a)$ est une limite de f au point a.

Des généralisations de cette notion, permettant par exemple de parler de limites « à l'infini » ou de dire qu'une intégrale est une limite de sommes de Riemann ont été définies ; les plus puissantes utilisent la notion de filtre.

Propriétés Modifier

- On dit qu'un espace topologique est *séparé* ou *de Hausdorff* ou T_2 lorsque deux points distincts quelconques admettent des voisinages disjoints. C'est le plus courant des axiomes de séparation.
- On dit qu'un espace vérifie la *propriété de Borel-Lebesgue* lorsqu'on peut extraire un sous-recouvrement fini de tout recouvrement ouvert. On parle aussi d'*espace quasi-compact*.
- Un espace quasi-compact et séparé est dit *compact*.
- Il existe beaucoup d'autres propriétés topologiques (métrisabilité, connexité, connexité par arcs, connexité simple, propriété de Baire, paracompacité, espace résoluble…) et chacune d'entre elles a une version locale.
- D'autres propriétés (précompacité, complétude…) sont liées à une structure uniforme,

plus riche qu'une simple topologie, ou même (espace borné…) à une distance.

Notes et références Modifier

Notes Modifier

1.

4. Compte tenu de la condition 1, la condition 5 peut se réécrire : pour tout voisinage V de a, l'ensemble des x dont V est un voisinage est lui-même un voisinage de a.

Références Modifier

1.

4. Grégory Berhuy, « Comment définir une topologie ? » [archive], sur Institut Fourier, Université Grenoble-Alpes.

Voir

- Analyse
- Probabilités / Statistique
- Algèbre linéaire

Chapitre 6 — Estimation

- 1 Introduction
- 2 Distribution d'échantillonnage
    - 2.1 Définition
    - 2.2 Loi de probabilité de la moyenne
    - 2.3 Loi de probabilité d'une fréquence
- 3 Estimateur
    - 3.1 Définition
    - 3.2 Propriétés
- 4 Estimation ponctuelle et par intervalle
    - 4.1. Estimation ponctuelle
    - 4.2. Estimation par intervalle

1 Introduction

Un phénomène biologique sera entièrement déterminé si l'on connaît la loi de probabilité suivie par la variable aléatoire donnée dans la population. On a alors deux cas de figure :

- soit la **loi de probabilité suivie par *X***

- **est inconnue** mais sugérée par la description de l'échantillon (nature de la variable, forme de la distribution des fréquences, valeurs des paramètres descriptifs) (chapitre 4). Dans ce cas, il est nécessaire d'**estimer** les paramètres de la loi de probabilité à partir des paramètres établis sur l'échantillon.

L'inférence statistique traite principalement de ces deux types de problèmes : l'**estimation de paramètres** (espérance, variance, probabilité de succés) et **les tests d'hypothèses**. L'inférence statistique ne conduit jamais à une conclusion stricte, elle attache toujours **une probabilité à cette conclusion**. Cela provient du fait que l’on tente de tirer des conclusions sur une population (grand nombre d’individus) sur la base des observations realisées sur un échantillon, représentant une portion restreinte de la population.

L’**estimation** a pour objectif de déterminer les valeurs inconnues des paramètres de la population (p

, μ, $\sigma2$, q) ou (proportion, moyenne, variance, paramètre quelconque) à partir des données de l’échantillon (f, $\bar{x}$, $\sigma2$

). Il est alors nécessaire de déterminer la précision de ces estimations en établissant **un intervalle de confiance** autour des valeurs prédites.

Les **statistiques inférentielles** ou inductives peuvent se résumer par le schéma suivant :

2 Distribution d’échantillonnage

Pour résoudre les problèmes d’estimation de paramètres inconnus, il faut tout d’abord étudier les **distributions d’échantillonnage**, c’est à dire la loi de probabilité suivie par l’estimateur.

Remarque : En théorie de l’estimation, il s’agit de distinguer soigneusement trois concepts différents :

- les paramètres de la **population** comme la moyenne m dont la valeur est certaine mais inconnue symbolisés par des **lettres grecques**.
- les résultats de **l’échantillonnage** comme la moyenne $\bar{x}$
- dont la valeur est incertaine puisque aléatoire mais dont la loi de probabilité est souvent connue et symbolisées par des **majuscules**.

2.1 Définition

2.1.1 Approche empirique

Il est possible d’extraire d’une population de paramètres p

, μ ou ^2$ pour une variable aléatoire X, k échantillons aléatoires simples de même effectif, n. Sur chaque échantillon de taille n, on calcule les paramètres descriptifs (f, $\bar{x}$, $s2$

).

On obtient ainsi pour chaque paramètre estimé, une série statistique composée de k

éléments à savoir les k estimations du paramètre étudié. Par exemple, on aura k

valeurs de moyennes observées (graphe ci-dessus).

La distribution associée à ces k

estimations constitue la **distribution d'échantillonnage du paramètre**. On peut alors associer une variable aléatoire à chacun des paramètres. La loi de probabilité suivie par cette variable aléatoire admet comme distribution, la distribution d'échantillonnage du paramètre auquel on pourra associer une espérance et une variance.

2.1.2 Approche théorique

En pratique, les données étudiées sont relatives à **un seul échantillon**. C'est pourquoi, il faut rechercher les propriétés des échantillons susceptibles d'être prélevés de la population ou plus précisément les lois de probabilité de variables aléatoires associées à un échantillon aléatoire.

Ainsi les n

observations $x1,x2,\ldots,xi,\ldots,xn$, faites sur un échantillon peuvent être considérées comme n variables aléatoires $X1,X2,\ldots,Xi,\ldots,Xn$. En effet, la valeur prise par le premier élément extrait de la population $X1$, dépend de l'échantillon obtenu lors du tirage aléatoire. Cette valeur sera différente si l'on considère un autre échantillon. Il en est de même pour les n

valeurs extraites de la population.

A partir de ces n

variables aléatoires, on peut définir alors une nouvelle variable qui sera fonction de ces dernières telle que :

$Y=f(X1,X2,\ldots,Xi,\ldots,Xn)$

par exemple : $Y=X1+X2+\ldots+Xi+\ldots+Xn$

Ainsi la loi de probabilité de la variable aléatoire Y

dépendra à la fois de la loi de probabilité de la variable aléatoire X et de la nature de la fonction f

.

2.2 Loi de probabilité de la moyenne

2.2.1 Définition

Soit X

une variable aléatoire suivant une loi normale d'espérance μ et de variance $\sigma2$ et n copies indépendantes $X1,X2,...,Xi,...,Xn$ telle que Xi associe le i^{ème} élément de chacun des n échantillons avec $E(Xi)=\mu$ et $V(X)=\sigma2$

On construit alors **la variable aléatoire $\bar{X}$**

, telle que

$\bar{X}=X1+X2+...+Xi+...+Xnn=1n\sum i=1nXi$

avec pour **espérance** :

$E(X)^{-}=E(1n\sum i=1nXi)=1nE(\sum i=1nXi)=1n\sum i=1nE(Xi)=1nn\mu$

d'où $E(X)^{-}=\mu$

$E(X)^{-}$ est notée également $\mu\bar{X}$

et pour **variance** si $V(Xi)=\sigma2$

:

$V(X)^{-}=V(1n\sum i=1nXi)=1n2V(\sum i=1nXi)=1n2\sum i=1nV(Xi)=1n2n\sigma2$

d'où $V(X)^{-}=\sigma2n$

$V(X)^{-}$ est notée également $\sigma\bar{X}2$

La **loi de probabilité** de la variable aléatoire $\bar{X}$

, moyenne de n v.a. X de loi de probabilité N(μ,σ), est une **loi normale** N($\mu,\sigma n\surd$)

.

Remarque : il est aisé de voir sur le graphe ci-dessous que la variance associée à une moyenne ($\sigma2n$

) est plus faible que la variance de la variable elle-même ($\sigma2$

).

Soit l'étendue des valeurs observées d'une variable aléatoire X

pour 4 échantillons de même taille d'une même population.

Les valeurs des moyennes arithmétiques sont indiquées ainsi que les limites relatives à l'étendue des valeurs de la **variable** observée et celle des **moyennes** observées.

Exemple :

Des études statistiques montrent que le taux de glucose dans le sang est une variable normale X

d'espérance μ=1 g/l et d'écart-type σ=0,1

g/l.

En prenant un échantillon de 9 individus dans la population, l'espérance et l'écart-type théorique attendu de la variable aléatoire $\bar{X}$

sont alors :

$\mu\bar{X}=\mu=1$

g/l et $\sigma\bar{X}=\sigma n\surd=0{,}19\surd=$

0,03 g/l

2.2.2 Convergence

En fonction de la nature de la variable aléatoire continue X

, de la taille de l'échantillon n et de la connaissance que nous avons sur le paramètre $\sigma 2$, la variable centrée réduite construite avec $\bar{X}$

converge vers différentes lois de probabilité (**Table de convergence**).

Lorsque $\boldsymbol{\sigma 2}$

est connue et $\boldsymbol{n}$ **grand (**$\boldsymbol{n\geq 30}$

), on se trouve dans les conditions du **théorème central limite** et la loi suivie par :

$\bar{X}-\mu\sigma/n\surd=\mathrm{N}(0,1)$

loi normale réduite

Ceci reste vrai lorsque $\boldsymbol{n\leq 30}$

seulement si la loi suivie par $\boldsymbol{X}$

suit une loi normale.

Lorsque la variance $\boldsymbol{\sigma 2}$

est inconnue et $\boldsymbol{X}$ **suit une loi normale**, la loi suivie par la variable centrée réduite est alors: $\bar{X}-\mu\hat{\sigma}/n\surd\to Tn-1$ **loi de student** à $n-1$

degrés de liberté

Lorsque $\boldsymbol{n\geq 30}$

, la loi de student **tend** vers une loi normale réduite (voir **convergence**).

Lorsque $\boldsymbol{\sigma 2}$

est inconnue et $\boldsymbol{X}$

ne suit pas une loi normale, la loi suivie par

$\bar{X}-\mu\hat{\sigma}/n\surd$

n'est pas connue.

2.3 Loi de probabilité d'une fréquence

Soit une population dans laquelle une proportion p

des individus présente une certaine propriété.

Si k

est le nombre d'individu présentant la propriété dans un échantillon de taille n, alors la variable aléatoire K résultant de différents échantillonnages suit une loi binomiale B(n,p) avec $E(K)=np$ et $V(K)=npq$

.

On construit la variable aléatoire $F=Kn$

avec

pour **espérance** : $E(F)=E(Kn)=1nE(K)=1nnp=p$

et pour **variance** : $V(F)=V(Kn)=1n2V(K)=1n2npq=pqn$

La **loi de probabilité** d'une fréquence Kn

, suit une **loi normale** $ (p, $pqn--\surd$)

vrai si $np>5$

et $nq>5$

.

3 Estimateur

3.1 Définition

Soient $X1,X2,\ldots,Xi,\ldots,Xn$

réalisations indépendantes de la variable aléatoire X (discrète ou continue) et θ un paramètre associé à la loi de probabilité suivi par X, un **estimateur** du paramètre θ est une variable aléatoire Θ fonction des Xi

:

$\Theta=f(X1,X2,\ldots,Xi,\ldots,Xn)$

Si on considère n

observations $x1,x2,\ldots,xi,\ldots,xn$, l'estimateur Θ fournira **une estimation** de θ notée également θ^

:

$\theta\hat{}=f(x1+x2+\ldots+xi+\ldots+xn)$

L'estimation d'un paramètre inconnu, noté θ

est fonction des observations résultant d'un échantillonnage aléatoire simple de la population. L'estimateur est donc une nouvelle variable aléatoire construite à partir des données expérimentales et dont la valeur se rapproche du paramètre que l'on cherche à connaître.

L'**estimation** de θ

est une variable aléatoire Θ dont la distribution de probabilité s'appelle la **distribution d'échantillonnage** du paramètre θ. L'estimateur Θ admet donc une espérance $E(\Theta)$ et une variance $V(\Theta)$

.

3.2 Propriétés

3.2.1 Convergence

L'estimateur Θ

doit tendre vers la valeur réelle du paramètre θ

lorsque le nombre d’individus étudié augmente. On dit que **l’estimateur est convergent**.

si $\forall \varepsilon > 0 P(|\Theta - \theta|) > \varepsilon \to 0$

lorsque $n \to \infty$

Ceci équivaut à dire qu’en limite $\Theta \to \theta$

lorsque $n \to \infty$

.

3.2.2 Biais d’un estimateur

Le biais d’un estimateur noté $B(\Theta)$

est la différence moyenne entre sa valeur et celle du paramètre qu’il estime. Le biais doit être égal à 0 pour avoir un bon estimateur.

$B(\Theta) = E(\Theta - \theta) = E(\Theta) - E(\theta) = E(\Theta) - \theta = 0$

(voir **propriétés de l’espérance**)

d’où $E(\Theta) = \theta$

Ainsi l’estimateur sera **sans biais** si son espérance est égale à la valeur du paramètre de la population.

$E(\Theta) = \theta$

Exemple :

Soit les densités de probabilité de 3 estimateurs d’une espérance μ

,

Dans l’exemple ci-dessus, $\Theta1$

et $\Theta2$ sont des estimateurs sans biais de μ car $B(\Theta1) = E(\Theta1 - \mu) = E(\Theta1) - \mu = 0$ car $E(\Theta1) - \mu$, de même pour $B(\Theta2)$

alors que $\Theta3$

est un **estimateur biaisé** de μ

car

$B(\Theta 3)=E(\Theta 3-\mu)=E(\Theta 3)-\mu=\mu'-\mu\neq 0$

car $E(\Theta 3)=\mu'$

Remarque: Un estimateur est asymptotiquement sans biais si $E(\Theta)\to\theta$

lorsque $n\to\infty$

.

3.2.3 Variance d’un estimateur

Si deux estimateurs sont convergents et sans biais, le plus efficace est celui qui a **la variance la plus faible** car ses valeurs sont en moyenne plus proches de la quantité estimée.

$V(\Theta)=E(\Theta-E(\Theta))2$

minimale

Exemple :

Dans l’exemple précédent, on voit que $V(\Theta 1)<V(\Theta 2)$

. On peut donc conclure que $\Theta 1$ est un meilleur estimateur de μ que $\Theta 2$

.

Remarque : Quand les estimateurs sont biaisés, en revanche, leur comparaison n’est pas simple. Ainsi un estimateur peu biaisé mais de variance très faible, pourrait même être préféré à un estimateur sans biais mais de grande variance.

Théorème :

Si un estimateur est asymptotiquement sans biais et si sa variance tend vers 0 lorsque $n\to\infty$

, il est convergent.

$P(|\Theta-\theta|\geq\varepsilon)\leq V(\Theta)\varepsilon 2$

avec $\varepsilon>0$

(**Inégalité de Bienaymé-Tchébycheff**)

Cette inégalité exprime que si $|\Theta-\theta|$

tend vers 0 quand n augmente, $V(\Theta)$

doit aussi tendre vers 0.

4 Estimation ponctuelle et par intervalle

L'**estimation** d'un paramètre quelconque θ

est **ponctuelle** si l'on associe **une seule valeur** à l'estimateur $\theta\hat{}$ à partir des données observables sur un échantillon aléatoire. L'**estimation par intervalle** associe à un échantillon aléatoire, **un intervalle** $[\theta\hat{}1,\theta\hat{}2]$ qui recouvre θ

avec une certaine probabilité.

4.1. Estimation ponctuelle

Si la distribution de la variable aléatoire X

est connue, on utilise la **méthode du maximum de vraisemblance** pour estimer les paramètres de la loi de probabilité. En revanche si la distribution n'est pas connue, on utilise **la méthode des moindres carrés**.

4.1.1. Espérance

Soit X

une variable aléatoire continue suivant une loi normale N(μ,σ) dont la valeur des paramètres n'est pas connue et pour laquelle on souhaite estimer **l'espérance** $\boldsymbol{\mu}$

.

Soient $X1,X2,\dots,Xi,\dots,Xn$

, n réalisations indépendantes de la variable aléatoire X, un estimateur du paramètre μ est une suite de variable aléatoire Θ fonctions des Xi

:

$\Theta=f(X1,X2,\dots,Xi,\dots,Xn)$

La méthode des **moindres carrés** consiste à rechercher les coefficients de la combinaison linéaire

$\Theta=a1X1+a2X2+\dots+aiXi+\dots+anXn$

telle que $E(\Theta)=\mu$

et $V(\Theta)$

soit minimale (voir **démonstration**)

La **moyenne arithmétique** constitue le meilleur estimateur de $\boldsymbol{\mu}$

, espérance de la loi de probabilité de la variable aléatoire X

:

$\hat{\mu} = \bar{X} = \frac{1}{n}\sum_{i=1}^{n} X_i$

Voici pourquoi :

Estimateur sans biais : $E(\bar{X}) = \mu$

(**voir loi de la moyenne**)

Estimateur convergent : si l’on pose l’**inégalité de Biénaymé-Tchébycheff** :

$P(|\bar{X} - \mu| \geq \varepsilon) \leq \frac{V(\bar{X})}{\varepsilon^2}$

avec $\varepsilon > 0$

lorsque $n \to \infty$ $\frac{V(\bar{X})}{\varepsilon^2} = \frac{\sigma^2}{n\varepsilon^2}$

et ceci ainsi en limite, $P(|\bar{X} - \mu| \geq \varepsilon) = 0$ ce qui indique que $\bar{X} \to \mu$

en probabilité.

4.1.2. Variance

Soit X

une variable aléatoire continue suivant une loi normale N(μ,σ) pour laquelle on souhaite estimer **la variance** $\boldsymbol{\sigma^2}$

.

Soient $X_1, X_2, \ldots, X_i, \ldots, X_n$

réalisations indépendantes de la variable aléatoire X, un estimateur du paramètre σ^2 est une suite de variable aléatoire Θ fonctions des X_i

:

$\Theta = f(X_1 + X_2 + \ldots + X_i + \ldots + X_n)$

- Cas où l’espérance μ

- est connue

La méthode des moindres carrés consiste à rechercher les coefficients de la combinaison linéaire

$\Theta=a_1(X_1-\mu)^2+a_2(X_2-\mu)^2+\ldots+a_i(X_i-\mu)^2+\ldots+a_n(X_n-\mu)^2$

telle que $E(\Theta)=\sigma^2$

et $V(\Theta)$

soit minimale (voir **démonstration**)

La **variance observée** constitue le meilleur estimateur de σ^2

, variance de la loi de probabilité de la variable aléatoire X lorsque $\boldsymbol{\mu}$

est connue:

$\hat{\sigma}^2=\frac{1}{n}\sum_{i*1}^{n}(X_i-\mu)^2$

Remarque : Cette estimation de la variance de la population est rarement utilisée dans la mesure où si la variance σ^2

n’est pas connue, l’espérance μ

ne l’est pas non plus.

- Cas où l’espérance μ
- est inconnue

Dans ce cas, nous allons estimer m avec $\hat{\mu}=\bar{X}$

et dans ce cas $\sum_{i=1}^{n}(X_i-\mu)^2\neq\sum_{i=1}^{n}(X_i-\bar{X})^2$

. Nous allons étudier la relation entre ces deux termes à partir de la variance observée :

$s^2=\frac{1}{n}\sum_{i=1}^{n}(X_i-\bar{X})^2=\frac{1}{n}\sum_{i=1}^{n}[(X_i-\mu)-(\bar{X}-\mu)]^2$

$s^2=\frac{1}{n}\sum_{i=1}^{n}[(X_i-\mu)^2+(\bar{X}-\mu)^2-2(X_i-\mu)(\bar{X}-\mu)]$

$s^2=\frac{1}{n}\sum_{i=1}^{n}(X_i-\mu)^2+\frac{1}{n}\sum_{i=1}^{n}(\bar{X}-\mu)^2-2(\bar{X}-\mu)\sum_{i=1}^{n}(X_i-\mu)$

avec $\sum_{i=1}^{n}(X_i-\mu)=n(\bar{X}-\mu)$

$s^2=\frac{1}{n}\sum_{i=1}^{n}(X_i-\mu)^2+(\bar{X}-\mu)^2-2(\bar{X}-\mu)^2$

$s2=1n\sum i=1n(Xi-\mu)2-(\bar{X}-\mu)2=\sigma2-\sigma2n$

en effet $\sigma\bar{X}2=1n\sum i=1n(\bar{X}-\mu)2=(\bar{X}-\mu)2=\sigma2n$

ainsi $s2=n-1n\sigma2$

Le meilleur estimateur de $\sigma2$

, variance de la loi de probabilité de la variable aléatoire X lorsque **μ est inconnue** est :
$\sigma\hat{}2=nn-1s2=1n-1\sum i=1n(Xi-X)2\bar{}$

Remarque : Lorsque n

augmente, la variance observée $s2$ tend vers la variance de la population $\sigma2$

.

$\lim n\to+\infty s2=\lim n\to+\infty n-1n\sigma2=\sigma2$

4.1.3. Fréquence

Soit le schéma de Bernoulli dans lequel le caractère A correspond au succés. On note p

la fréquence des individus de la **population** possédant le caractère A. La valeur de ce paramètre étant inconnu, on cherche à estimer la fréquence p

à partir des données observables sur un échantillon.

A chaque échantillon non exhaustif de taille n

, on associe l'entier k

, nombre d'individus possédant le caractère A.

Soit K

une variable aléatoire discrète suivant une loi binomiale B(n,p) et pour laquelle on souhaite estimer **la fréquence *p***

.

La **fréquence observée** du nombre de succès observé dans un échantillon de taille n

constitue le meilleur estimateur de p

:

$\hat{p}=Kn$

Voici pourquoi :

Estimateur sans biais : $E(Kn)=p$

(**voir loi d’une fréquence**)

Estimateur convergent : si l’on pose l’**inégalité de Biénaymé-Tchébycheff** :

$P(|Kn-p|\geq\varepsilon)\leq V(Kn)\varepsilon 2$

avec $\varepsilon>0$

alors lorsque $n\to\infty$ $V(Kn)\varepsilon 2=pqn\varepsilon 2\to 0$

et ceci $\forall\varepsilon>0$

ainsi en limite $P(|Kn-p|\geq\varepsilon)=0$

ce qui indique que $Kn\to p$

en probabilité.

Remarque : Nous avions déjà avancé cette propriété lors de l’établissement de **la loi des grands nombres**.

Exemple :

On a prélevé au hasard, dans une population de lapin, 100 individus. Sur ces 100 lapins, 20 sont atteints par la myxomatose. Le pourcentage de lapins atteints par la myxomatose dans la population est donc : $\hat{p}=Kn=20100$

= **0,2** soit 20% de lapins atteins dans la population

Ce résultat n’aura de signification que s’il est associé à un **interval de confiance**.

4.2. Estimation par intervalle

4.2.1. Définition

L’**estimation par intervalle** associe à un échantillon aléatoire, **un intervalle** $[\hat{\theta 1}$

$,\hat{\theta 2}]$ qui recouvre θ

avec une certaine probabilité.

Cet intervalle est appelé l’**intervalle de confiance** du paramètre θ

car la probabilité que θ dont la valeur est inconnue se trouve compris entre $\hat{\theta 1}$ et $\hat{\theta 2}$ est égale à $1-\alpha$

, **le coefficient de confiance**.

$P(\theta1\text{^}<\theta<\theta2\text{^})=1-\alpha$

Son complément α

correspond au **coefficient de risque**.

$P(\theta\neq[\theta1\text{^},\theta2\text{^}])=\alpha$

Un intervalle de confiance indique **la précision d’une estimation** car pour un risque α

donné, l’intervalle est d’autant plus grand que la précision est faible comme l’indiquent les graphes ci-dessous. Pour chaque graphe, l’aire hachurée en vert correspond au coefficient de risque α. Ainsi de part et d’autre de la distribution, la valeur de l’aire hachurée vaut $\alpha 2$

.

4.2.2 Intervalle de confiance d’une moyenne

En fonction de la nature de la variable aléatoire continue X

, de la taille de l’échantillon n et de la connaissance que nous avons sur le paramètre $\sigma 2$, l’établissement de l’intervalle de confiance autour de μ

sera différent.

- **Quelque soit la valeur de n**

, si $X\rightarrow N(\mu,\sigma)$ et $\sigma 2$ est connue, établir l’intervalle de confiance autour de la moyenne μ revient à établir la valeur de i

- pour une valeur du coefficient de confiance 1 - a donnée par l’expérimentateur.

Voici comment :

Si $P(\bar{X}-i<\mu<\bar{X}+i)=1-\alpha$

alors $P(\mu-i<barX<\mu+i)=1-\alpha$

Connaissant la **loi suivie par la v.a. $\bar{X}$**

et d'après **le théorème central limite**, on peut établir que $P(-i\sigma/n\surd<\bar{X}-\mu\sigma/n\surd<+i\sigma/n\surd)=1-\alpha$ sachant que $\bar{X}-\mu\sigma/n\surd\rightarrow \mathrm{N}(0,1)$

(**conditions**)

par conséquence $||i\sigma/n\surd||$

correspond à la valeur de la **variable normale réduite** pour probabilité α donnée notée $\varepsilon\alpha$

ou **écart réduit**.

ainsi $||i\sigma/n\surd||=\varepsilon\alpha$

implique $i=\varepsilon\alpha\times\sigma n\surd$

L'**intervalle de confiance de la moyenne μ**

pour un coefficient de risque α

est donc

$\bar{X}-\varepsilon\alpha\sigma n\surd<\mu<\bar{X}+\varepsilon\alpha\sigma n\surd$

quelque soit la valeur de n

si $X\rightarrow \mathrm{N}(\mu,\sigma)$ et $\sigma 2$

est connue

Exemple :

Pour des masses comprises entre 50g et 200g, une balance donne une pesée avec une variance de 0,0015. Les résultats des trois pesées d'un même corps sont : 64,32 ; 64,27 ; 64 ,39.

On veut connaître le poids moyen de ce corps dans la population avec un coefficient de confiance de 99%.

avec $\bar{X}$

= 64,33 et $\varepsilon\alpha$= 2,576 alors $\varepsilon\alpha\sigma n\surd=2{,}576\times0{,}0391{,}732$

= **0,058**

et donc $\mu=\bar{X}\pm\varepsilon\alpha\sigma n\surd$

= 64,33g ± 0,058

d’où le poids moyen de ce corps est compris dans l’intervalle [64,27 ; 64,39] avec une probabilité de 0,99.

Remarque : La valeur de $\varepsilon\alpha$

est donnée par la **table de l’écart-réduit** pour une valeur α

donnée.

- Quelque soit la valeur de n

, si $X\to(\mu,\sigma)$ et $\sigma 2$

- est inconnue

Le raisonnement reste le même mais la variance de la population $\sigma 2$

doit être estimée par

$\sigma 2\hat{}=nn-1s2$

(voir **estimation ponctuelle**)

Si $P(\bar{X}-i<\mu<\bar{X}+i)=1-\alpha$

alors $P(\mu-i<barX<\mu+i)=1-\alpha$

Connaissant la **loi suivie par la v.a.** $\bar{X}$

et celle suivie par la variable centrée réduite, on peut établir que $P(-i\sigma\hat{}/n\surd<\bar{X}-\mu\sigma\hat{}/n\surd<+i\sigma\hat{}/n\surd)=1-\alpha$ sachant que $\bar{X}-\mu\sigma\hat{}/n\surd\to T(n-1$ d.d.l.)

(**conditions**)

par conséquence $|||i\sigma\hat{}/n\surd|||$

correspond à la valeur de la **variable de student** pour une valeur de probabilité a donnée notée $t\alpha$ pour $n-1$

degrés de liberté.

Ainsi $|||i\sigma\hat{}/n\surd|||=t\alpha$

implique $i=t\alpha\times\sigma\hat{}\,n\surd$

L'**intervalle de confiance de l'espérance μ**

pour un coefficient de risque α est donc $\bar{X}-t\alpha\sigma\hat{}\,n\surd<\mu<\bar{X}+t\alpha\sigma\hat{}\,n\surd$ quelque soit la valeur de n si $X\rightarrow \mathrm{N}(\mu,\sigma)$ et $\sigma 2$

est **inconnue**

Remarque : Lorsque $n>30$

la loi de student converge vers une loi normale réduite ainsi la valeur de $t\alpha(n-1)$ est égale à $\varepsilon\alpha$. Ci-dessous, un exemple pour un risque $\alpha=0{,}05$

Exemples :

1. Dans un échantillon de **20 étudiants** de même classe d'âge et de même sexe, la taille moyenne observée est de 1,73m et l'écart-type de 10 cm. La taille moyenne de l'ensemble des étudiants de l'université est donc :

avec $\bar{x}=$

1,73m ; $\sigma 2\hat{}=nn-1s2=2019\times0{,}01=$ 0,011 et $t\alpha=$

2,086

d'où $t\alpha\sigma\hat{}\,n\surd=2{,}086\times0{,}01120{-}{-}{-}{-}\surd=$

0,049 ainsi $\mu=\bar{X}\pm t\alpha\sigma\hat{}\,n\surd=$

1,73 ± 0,049

La **taille moyenne** des étudiants dans la population est comprise dans l'intervalle **[1,68 ; 1,78]** avec une probabilité de 0,95.

2. Dans un échantillon de 100 étudiants, la taille moyenne de la population est :

$\bar{x}=$

1,73m ; $\sigma\hat{}2=nn-1s2=10099\times0{,}01=$ 0,01 et $\varepsilon\alpha=$

1,960

d'où $\varepsilon\alpha\sigma\hat{}\,n\surd=1{,}960\times0{,}010100{-}{-}{-}{-}\surd=$

0,02 ainsi $\mu=\bar{X}\pm\varepsilon\alpha\sigma\hat{}\,n\surd$

= 1,73 ± 0,02

La **taille moyenne** des étudiants dans la population est comprise dans l’intervalle **[1,71 ; 1,75]** avec une probabilité de 0,95.

Ainsi lorsque **la taille** de l’échantillon **augmente** pour un même coefficient de confiance $(1-\alpha)$

, l’estimation autour de m est **plus précise**.

- Si $n>30$

et X

- suit une loi inconnue

La démarche est la même que pour le cas précédent puisque par définition la variance de la population est inconnue et doit être estimée avec la variance observée :

$\sigma\hat{}2=nn-1s2$

(voir **estimation ponctuelle**)

Comme pour le cas 1, la loi suivie par la variable centrée réduite $X\bar{}-\mu\sigma\hat{}/n\surd\rightarrow \mathrm{N}(0,1)$

(**conditions**).

L’**intervalle de confiance de l’espérance** $\boldsymbol{\mu}$

pour un coefficient de risque α est donc $X\bar{}-\varepsilon\alpha\sigma\hat{}n\surd<\mu<X\bar{}+\varepsilon\alpha\sigma\hat{}n\surd$

vraie seulement si $\boldsymbol{n}$

est grand

- Si $n<30$

et X

- suit une loi inconnue,

La loi de probabilité suivie par $X\bar{}-\mu\sigma\hat{}/n\surd$

n’est pas connue et l’on a recours aux **statistiques non paramétriques**.

4.2.3 Intervalle de confiance d’une proportion

Etablir l’intervalle de confiance autour de la fréquence p

de la population à partir de son estimateur Kn revient à établir la valeur de i pour une valeur du coefficient de confiance $(1-\alpha)$

donnée par l'expérimentateur telle que :

$P(Kn-i<p<Kn+i)=1-\alpha$

ou $P(p-i<Kn<p+i)=1-\alpha$

Connaissant la loi suivie par la v.a. Kn

et d'après **le théorème central limite**, on peut établir que $P(-ipqn\surd<Kn-ppqn\surd<+ipqn\surd)=1-\alpha$ sachant que $Kn-ppqn\surd\rightarrow \mathrm{N}(0,1)$

par conséquence $|||ipqn\surd|||$

correspond à la valeur de la **variable normale réduite** pour probabilité a donnée notée $\varepsilon\alpha$

ou **écart réduit**.

ainsi $|||ipqn\surd|||=\varepsilon\alpha$

implique $i=\varepsilon\alpha\times pqn--\surd$

Par définition, $V(Kn)=pqn$

n'est pas connue et on l'estime par $p\hat{}\,q\hat{}\,n$ avec $p\hat{}=Kn$ et $q\hat{}=n-Kn$

L'**intervalle de confiance de la fréquence** p

pour un coefficient de risque α

est donc

$Kn-\varepsilon\alpha p\hat{}\,q\hat{}\,n---\surd<p<Kn+\varepsilon\alpha p\hat{}\,q\hat{}\,n---\surd$

vraie seulement si $\boldsymbol{n}$

est grand et $\boldsymbol{np,nq>5}$

Remarque : Si la taille de l'échantillon est faible, on a recours aux lois exactes.

Exemple :

Un laboratoire d'agronomie a effectué une étude sur le maintien du pouvoir germinatif des graines de *Papivorus subquaticus* après une conservaion de 3 ans.

Sur un lot de 80 graines, 47 ont germé. Ainsi la probabilité de germination des graines de *Papivorus subquaticus* après trois ans de conservation avec un coefficient de confiance de 95% est donc :

avec $p\hat{}=Kn=4780=0{,}588$

, $q\hat{}=n-Kn=3380=0{,}412$ et $\varepsilon\alpha=1{,}96$

alors $\varepsilon\alpha p\hat{}q\hat{}n{-}{-}{-}\sqrt{}=1{,}96\times0{,}588\times0{,}41280{-}{-}{-}{-}{-}{-}{-}{-}\sqrt{}=0{,}108$

d’où ***p*=**

0,588 ± 0,108

ainsi **la probabilité de germination est** comprise dans l’intervalle **[0,480 et 0,696]** avec une probabilité de **0,95**.

- **est connue *a priori*** et on vérifie *a posteriori* que les observations faites à partir d’un échantillon sont en accord avec elle. C’est le cas par exemple de la répartition des génotypes attendus dans une population sous la loi de Mendel. On effectue alors **un test de conformité** entre la distribution théorique et la distribution observée (chapitre 6).

- soit la **loi de probabilité suivie par *X***

- dont la valeur est certaine mais connue symbolisés par des **minuscules**.

- les **variables aléatoires des paramètres**, comme la moyenne aléatoire $\bar{X}$

aussi

- La propriété 1 est en fait redondante, puisqu'on peut obtenir l'ensemble vide en appliquant la propriété 2 à la réunion indexée par ∅, et l'ensemble *E* en appliquant la propriété 3 à l'intersection indexée par ∅, qui par convention dans ce contexte est égale à *E* (N. Bourbaki, *Éléments de mathématique, livre III : Topologie générale* [détail des éditions], p. I.1 [archive]).
-
- Via la bijection canonique entre applications de *P*(*E*) dans *P*(*E*) et relations de *E* dans *P*(*E*), explicitée par exemple dans cet exercice corrigé sur Wikiversité.
-
- Reformulation de Bourbaki, p. I.3 [archive], N° 2, proposition 2, où nos conditions 2 et 3 sont regroupées en une seule : « Toute intersection finie de voisinages de *a* est un voisinage de *a* », avec la convention — déjà mentionnée dans la note ci-dessus de la section « Définition par les ouverts » — que l'intersection indexée par ∅ est *E*.
-
- Kazimierz Kuratowski, « Sur l'opération *A* de l'Analysis Situs », *Fundamenta Mathematicae*, vol. 3, 1922, p. 182-199 (lire en ligne [archive]).
-
- (en) K. D. Joshi, *Introduction to General Topology*, New Age International, 2004 (1re éd. 1983) (lire en ligne [archive]), p. 114
-
- (en) David B. Gauld, « Nearness - a better approach to topology », *Math. Chronicle*, vol. 7, nos 1-2, 1978, p. 80-90 (lire en ligne [archive]).
-

On Sun, Sep 17, 2023 at 12:19 PM tshingombe fiston <tshingombefiston@gmail.com> wrote:

- Docs »
- Structures de données
- View page source

Structures de données

Note

Le type Struct proposé dans ce cours n'est pas standard en Python. Il a été programmé pour les besoins du cours, notamment pour approcher de manière progressive la notion de classe, qui sera abordée dans la deuxième partie du cours.

Une structure est un ensemble non ordonné de valeurs ayant potentiellement des types différents. Les valeurs que contient la structure sont appelées ses *champs*, et sont identifiés par un nom.

Un type de structure (ou type de données structuré) spécifie un ensemble de champs (leur nom et leur type).

Pré-requis

Afin d'utiliser les structures en Python, il est nécessaire :

- de télécharger le module algo.py à l'adresse http://champin.net/2012/algo.py

- d'inclure la ligne suivante dans tous les programmes utilisant les structures :
- from algo import Struct

Déclaration d'un type de structure

Pour déclarer un type de structure, on utilisera une déclaration de la forme suivante :

- première ligne :
    - le mot-clé class,
    - le nom du nouveau type,
    - le texte (Struct),
    - le caractère *deux points* (:).
- lignes suivantes (indentées par rapport à la première)
    - le nom d'un champ

  - le caractère =
  - le nom du type associé à ce champ

Par exemple :

```
from algo import Struct

class Date(Struct):
    année=int
    mois=int
    jour=int

class Lieu(Struct):
    nom=str
    long=float
    lat=float
```

Notons que les champs d'une structure peuvent avoir eux même un type structuré :

```
class Personne(Struct):
    nom=str
    naissance=Date
```

Déclaration d'une structure

Une fois déclarés un ou plusieurs types structurés, il est possible de créer une donnée correspondant à un de ces types ainsi :

- le nom du type
- une parenthèse ouvrante (
- une liste de valeurs pour les champs, sous la forme nom=valeur, et séparées par des virgules,
- une parenthèse fermante).

NB: l'ordre des champs n'a pas d'influence.

Par exemple :

```
>>> d = Date(jour=23, mois=6, année=1912)
>>> p = Personne(nom="Alan Turing", naissance=d)
```

Opérations sur les structures

Les seules opérations sur les structures consistent en la lecture et la modification de leurs champs, en utilisant la « notation pointée » : on accède au champ en indiquant le nom de la structure, suivi d'un point, suivi du nom du champ :

```
>>> p.nom
```

```
'Alan Turin'
>>> p.d
Date(jour=22, mois=6, année=1912)
>>> p.nom = "Alan Turing"  # modification d'un champ
>>> p.nom
'Alan Turing'
```

Dans le cas où un champ contient lui même une structure, on peut enchaîner plusieurs notations pointées :

```
>>> p.naissance.année
```

[Type the document title]

répercutées sur l'au

```
>>> alan = p
>>> alan.nom
'Alan Turing'
>>> alan.nom = "A
>>> p.nom  # le ch
'Alan M. Turing'
```

Comparaison de st

Les structures peuv
opérateurs ne comp
seront toujours cons

```
>>> d1 = Date(jour
>>> d2 = Date(jour
>>> d1 == d2
False
```

La raison en est que
Ainsi, deux personn
même personne. Inv
valeurs de champs d

```
class Droite(Struct):
    a=float
    b=float
    c=float
    # représente la droite
    # d'équation ax + by + c = 0
```

Pour tester l'équivalence entre deux structures du même type, il convient donc d'écrire une fonction *spécifique* qui tiennent compte de la sémantique particulière des champs.

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Career tshingombe tshitadi
Engineering theory practical

to QCTO, TSHINGOMBEKB, tshitaditshingombe, tshingombetshitadi,
me, tshingombe

On Fri, 10 Mar 2023, 08:40 QCTO Certification, <Certification@qcto.org.za> wrote:

Good morning

Please note that the QCTO does not issue any statement of results

Regards

Bridgette Ngwenya Administrator: Certification	ngwenya.b@qcto.org.za Switch Board: +27 12 003 1800 Direct Tel: +27 12 003 1826	256 Glyn Street, Hatfield, Pretoria, 0083 Private Bag X278, Pretoria, 001 www.qcto.org.za	QCTO Fraud and Ethics Hotline FreeCall: 0800111894 qcto@thehotline.co.za FreeFax: 0867 26 1681 www.thehotline.co.za

From: TSHINGOMBEKB TSHITADI <tshingombekb@gmail.com>
Sent: Thursday, 09 March 2023 21:30
To: willsuport@dhet.co.za; fraudhotline@dhet.co.za; Callcentre@dhet.gov.za
Cc: careerhelp@dhet.gov.za; examirregularity@dhet.gov.za; foreignapplications <foreignapplications@saqa.co.za>; Foreign Institutions <foreigninstitutions@saqa.co.za>; study@stpeacecollege.com; info@stpeacecollege.co.za; info@shalomtechnicalcollege.co.za; assessment@qct.org.za; QCTO Certification <Certification@qcto.org.za>
Subject: Re: Application: for diplomat engineering electrical award certificate

Hello dear can find statement

On Thu, 03 Nov 2022, 17:20 TSHINGOMBEKB TSHITADI, <tshingombekb@gmail.com> wrote:

Name student : tshingombe Tshitadi

I'd :TIRCOG000910610

Application college St peace college

Submitted :admission permit and examination time table .

I'd:2004007064381./210000202023812

External center shalom Technical college..Afric training college .

Submitted entry I'd SAQA evaluation foreign qualifications team submitted: final award degree diploma certificate 1st submitted.. I'd 201911130002 return..school leaving saqa accepts ply qualifications issued by the official examine certification body in the country original where base external examination .

Practice saqa n engineering electrical stipulated the requirements that foreign award instituts must meet for is qualifications to be recognised.policy criteria for evaluation

Diploma dbetat certified .

South Africa qualifications member short course at peace college

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The results of February shalom close day graduation and start n6 graduation

Diploma SAQA entry in processing exam shalom no examination n3.n.4 for reasonaterial transcript.saqa leaving resulted irregularite level 4 practical ncv

.

St peace College exam July November time table submitted in shalom register was no successful came outcomes for reason irregularity and diploma shalom external was collapse.reason scaling internal internal was proof existing time table regularity result successful in St peace practical completed.

Thant u dear for regard our Portofilio submitted.

Portfolio learning examination previously papper additional information statement.

2 the.

Poe: assessment submitted engineering electrical topics evidence low learning supplementary subject saqa NQF level 6.7..completed assessment iccas Test .

Practice panel wiring St peace college attached. Documents.proof send examination irregularilarity final assessment level 6saqa..

Diplomat.

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Re: Processing appeal statement award degree diploma .resulta statement relever attandance, release resultat

Inbox

T

TSHINGOMBEKB TSHITADI 8:40 AM (2 hours ago)

to TSHINGOMBEKB, tshingombe, me, tshingombetshitadi,
tshitaditshingombe

On Thu, 09 Feb 2023, 10:12 TSHINGOMBEKB TSHITADI, <tshingombekb@gmail.com> wrote:
1.Award degree diplomat:award degree diploma .1th,2th,3th,4th
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3. Outcomes national :

T

TSHINGOMBEKB TSHITADI

8:42 AM (2 hours ago)

to **tshingombekb**, TSHINGOMBEKB, me,
tshingombetshitadi, tshingombe

On Thu, 09 Feb 2023, 11:11 TSHINGOMBEKB TSHITADI, <tshingombekb@gmail.com> wrote:
Requirements: task theory step input equation operation basic advance operationel mathematics system integration differential derivation fundamental low step system analyse system process fabrics investigate process device,
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On Thu, 09 Feb 2023, 10:44 TSHINGOMBEKB TSHITADI, <tshingombekb@gmail.com> wrote:
1.National qualification frame work .nqf6
. engineering n electrique and teacher NQF 7, education technology
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Model Product Testing and Model Testing in the Industry

The WBL-based industrial apprenticeship learning guide model that has been compiled is continued with model testing through expert ju

The importance of apprenticeship as a teaching method

Learning by doing is one of Pratt's five teaching approaches. Bloom and his colleagues designated psycho-motor skills as the

Key features of apprenticeship

Apprenticeship in online learning environments

The apprenticeship model of teaching can work in both face-to-face and online contexts, but if there is an online component, it usually works best in a hybrid format. One reason why some institutions are movin

- 1. Watch this Video on Theories of Learning
- 2. The Nature of Knowledge and the Implications of Teaching
- 3. Scenario: A Pre - Dinner Party Discussion
- 4. Art, Theory, Research, and Best Practices in Teaching
- 5. Epistemology and Theories of Learning
    - 5.1. What is Epistemology?
    - 5.2. Epistemology and Theories of Learning
- 6. Objectivism and Behaviourism
    - 6.1. The Objectivist Epistemology
    - 6.2. Objectivist Approaches to Teaching
    - 6.3. Behaviourism
- 7. Cognitivism
    - 7.1. What is Cognitivism?
    - 7.2. Cognitivist Learning Theory
    - 7.3. Applications of Cognitivist Learning Theory
- 8. Constructivism
    - 8.1. What is Constructivism?
    - 8.2. Constructivist Approaches to Teaching
- 9. Connectives
    - 9.1. What is Connectivism?
    - 9.2. Connectivism and Learning
    - 9.3. Applications of Connectivism to Teaching and Learning
- 10. Is the Nature of Knowledge Changing?
    - 10.1. Knowledge and Technology
    - 10.2. Knowledge as a Commodity
    - 10.3. The Nature of Academic Knowledge
    - 10.4. Academic Versus Applied Knowledge
    - 10.5. The Relevance of Academic knowledge in the Knowledge Society
    - 10.6. Academic Knowledge and Other Forms of Knowledge
- 11. Summary
- 12. Methods of Teaching: Campus-Focused
- 13. Scenario: A Stats Lecturer Fights the System
- 14. Five Perspectives on Teaching
- 15. The Origins of the Classroom Design Model
- 16. Transmissive Lectures: Learning by Listening
    - 16.1. Definition

  - 16.2. The Origins of the Lecture
  - 16.3. What Does Research Tell Us About the Effectiveness of Lectures?
  - 16.4. Does New Technology Make Lectures More Relevant?
  - 16.5. Is There Then No Role for Lectures in a Digital Age?
  - 16.6. Why are Lectures Still the Main Form of Educational Delivery?
  - 16.7. Is There a Future for Lectures in a Digital Age?
- 17. Interactive Lectures, Seminars, and Tutorials: Learning by Talking
  - 17.1. The Theoretical and Research Basis for Dialogue and Discussion
  - 17.2. Seminars and Tutorials
  - 17.3. Are Seminars a Practical Method in a Massive Education System?
- 18. Learning by Doing: Experiential Learning
  - 18.1. What is Experiential Learning?
  - 18.2. Core Design Principles
  - 18.3. Experiential Design Models
  - 18.4. Experiential Learning in Online Learning Environments
  - 18.5. Strengths and Weaknesses of Experiential Learning Models
- 19. Learning by Doing: Apprenticeship
  - **19.1. The Importance of Apprenticeship as a Teaching Method**
  - 19.2. Key Features of Apprenticeship
  - 19.3. University Apprenticeship
  - 19.4. Strengths and Weaknesses
- 20. Learning by Being: The Nurturing and Social Reform Models of Teaching:
  - 20.1. The Nurturing Perspective
  - 20.2. The Social Reform Perspective
  - 20.3. Past and Future: The Relevance of the Nurturing and Social Reform Methods for Connectivism
  - 20.4. The Roles of Learners and Teachers
  - 20.5. Strengths and Weaknesses of These Two Approaches
- 21. Relating Epistemology, Learning Theories and Teaching Methods
- 22. Scenario: Developing Historical Thinking
- 23. Online Learning and Teaching Methods
- 24. Old Wine in New Bottles: Classroom-Type Online Learning
  - 24.1. Live, Streamed Video
  - 24.2. Classes Using Lecture Capture
  - 24.3. Courses Using Learning Management Systems
  - 24.4. The Limitations of the Classroom Design Model for Online Learning
- 25. The ADDIE Model
  - 25.1. What is ADDIE?
  - 25.2. Where is ADDIE Used?
  - 25.3. What Are The Benefits of ADDIE?
  - 25.4. What Are The Limitations of ADDIE?
- 26. Online Collaborative Learning
  - 26.1. What is Online Collaborative Learning?
  - 26.2. Core Design Principles of OCL
  - 26.3. Community of Inquiry
  - 26.4. Developing Meaningful Online Discussion
  - 26.5. Cultural and Epistemological Issues
  - 26.6. Strengths and Weaknesses of Online Collaborative Learning
- 27. Competency-Based Learning
  - 27.1. What is Competency-Based Learning?
  - 27.2. Who Uses Competency-Based Learning?
  - 27.3. Designing Competency-Based Learning
  - 27.4. Strengths and Weaknesses
- 28. Communities of Practice
  - 28.1. The Theories Behind Communities of Practice
  - 28.2. What are Communities of Practice?

    - 28.3. Designing Effective Communities of Practice
    - 28.4. Critical Factors for Success
    - 28.5. Learning Through Communities of Practice in a Digital Age
- 29. Scenario: ETEC 522: Ventures in e-Learning
- 30. Activity (Reflective Thinking, Note Taking and Discussion)
- 31. Key Takeaways

ndustrial Apprenticeship Model Based on Work-Based Learning for Pre-service Teachers in Automotive Engineering

e low vocational competence of vocational teachers has become an essential issue in the last few decades. This problem is due to the lack of actual work experience in the industry for vocational teachers. One of the vocational skills improvement programs that are considered adequate is the industrial apprenticeship program. Many studies discuss apprenticeships, but there are still limited studies that examine effective apprenticeship programs to improve the competence of pre-service teachers at automotive engineering Vocational High Schools. Therefore, this study aims to determine the development of a Work-Based Learning (WBL)-based industrial apprenticeship model and its effectiveness to improve the competence of pre-service teachers at Vocational High Schools in the field of automotive engineering. This study uses an Education Research and Development (R&D) approach and involves two campuses in Central Java-Indonesia. There were 20 pre-service vocational teachers and three industry parties involved in the preliminary study. The preliminary study aims to obtain information about the problems and needs of the apprenticeship model. Furthermore, there were 60 pre-service vocational teachers and 12 industry parties involved in a follow-up study to test the effectiveness of the apprenticeship model. The sampling technique used is purposive sampling. The study results revealed that the WBL-based industrial apprenticeship model for pre-service vocational teachers in the automotive engineering field was considered feasible. In addition, the implementation of a WBL-based industrial apprenticeship can improve the competence of pre-service automotive engineering teachers, which includes knowledge, attitudes, and skills in the field of automotive engineering. The results of this study have implications for vocational education practitioners, especially higher education that organizes teacher education programs, to apply this apprenticeship model in preparing pre-service vocational teachers. This is because the WBL-based industrial apprenticeship model for pre-service voc

Vocational Education Teacher

Vocational education

Work-Based Learning

Brite (2013) defines the concept of WBL as learning that combines learning in the classroom and industry. They jointly design learning activities carried out in the world of work. WBL is implemented in Vocational High Schools by carrying out industrial work practices in its application. Raelin (2008) said that WBL combines theory lear

Materials and Methods

Development Model

This study uses an Education Research and Development approach. Development research is defined as a systematic study in the design, development, and evaluation of programs, processes, and teaching products that must meet the criteria of validity, practicality, and effectiveness. The development model in this study went through the stages of the conceptual model, theoretical model, hypothetical model, and final model. The conceptual model is an analytical model, which mentions the product components, analyzes the features in detail, and sh

Work-Based Learning-Based Industrial Apprenticeship Development Procedure

The WBL-based industrial apprenticeship model for pre-service vocational teachers was developed through analysis and study

Techniques and Instruments of Data Collection

The research instrument is a measuring

Data Analysis

Data analysis techniques include data analysis of model development and analysis of experimental data. Analysis of the model d

Finding and Discussion

This study focuses on developing a WBL-based industrial apprenticeship model for pre-service teachers of Automotive Engineering Education and comparing the effectiveness of the WBL-based industrial apprenticeship model with the conventional industrial apprenticeship model for teacher candidates. In the first stage, this study develops an industrial apprenticeship model based on WBL for pre-service teachers of Automotive Engineering Education. At this stage, data were obtained through an interview process with experts in vocational educa

Model Product Testing and Model Testing in the Industry

The WBL-based industrial apprenticeship learning guide model that has been compiled is continued with model testing through expert ju

The importance of apprenticeship as a teaching method

Learning by doing is one of Pratt’s five teaching approaches. Bloom and his colleagues designated psycho-motor skills as the

Key features of apprenticeship

Apprenticeship in online learning environments

The apprenticeship model of teaching can work in both face-to-face and online contexts, but if there is an online component, it usually works best in a hybrid format. One reason why some

eaching in a Digital Age

Course Introduction - Teaching in a Digital Age

Lesson 1 - Skills Needed in a Digital Age

Lesson 2 - Online Learning and Teaching Methods

Lesson 3 - Implementing Online Learning

Lesson 4 - Understanding the Learners

Lesson 5 - Theories of Learning

Lesson 6 - Learner Support

Lesson 7 - Choosing Media

Lesson 8 - Assessment Strategies

Lesson 9 - Quality Teaching in a Digital Age

Lesson 10 - Trends in Open Learning

Lesson 11 - Massive Open Online Courses

Lesson 12 - Emerging Technologies

Course Completion Certificate

entrepreneurial management Inbox tshingombe fiston <tshingombefiston@gmail.com> May 29, 2023, 12:05PM (3 days ago) to tshitaditshingombe, tshingombe, tshigombekb, tahitaditshingombe Welcome Engineering Computer science Management Accounting Finance Engineering training: Towards the engineer manager, or even entrepreneur? - School of engineering and engineers in Morocco Home / Engineering / Engineering training: Towards the engineer manager, or even entrepreneur? Engineering training: Towards the engineer manager, or even entrepreneur? March 21, 2020 admin0 commentsEngineering The continuous evolution of the labor market and the requirements of recruiters require an effort of adaptation on the part of people wishing to stand out from other job seekers. The engineer profile is particularly affected by these changes. Engineers working in teams or companies operating in different sectors are becoming increasingly aware of the importance of diversifying and enriching their engineering training with managerial skills. This dual skill actually allows the engineer to exercise his functions more effectively since he is increasingly called upon to exercise a management function within the company. On the other hand, managerial skills will also be very useful to him if he wishes to embark on entrepreneurship. Through this article, we will explain to you how the engineer is called upon to exercise managerial functions within the company or within the framework of his own project, and how the integration of soft skills in engineering training allow him to perform this function. Team management As an engineer manager, you will be required to manage teams, whether in the context of employment or entrepreneurship. Your role will be to set goals, assign tasks to team members, motivate and animate them, something that requires a number of organizational and managerial skills. However, the traditional engineering training remains in a large part of the training institutes, centered on technical and practical knowledge while neglecting the relational and communicational aspect which are considered the cornerstone of success within a team, see even in the workplace. Fortunately, some engineering colleges, aware of the importance of soft skills in engineering profiles, are beginning to integrate aspects of personal development into their training program. This will not only consolidate the managerial culture of the students and develop communication skills, but above all produce engineers with an assertive personality, capable of working in teams and occupying positions of responsibility, true engineer managers whose world needs! Business organization and project management For engineers wishing to evolve, grow and take responsibility for major projects, soft skills are now as important as other skills. Regardless of the field in which one operates, project management involves having the ability to organize the activity by planning and assigning the various tasks to the teams concerned, then ensuring permanent control and monitoring. To do this, certain human and managerial skills such as organizational skills, conflict management, responsiveness, flexibility, change management, leadership, self-confidence and communication skills are essential to success in their role, especially for the engineering manager. This is also valid for anyone wishing to embark on entrepreneurship and create their own business. However, you can only really learn how to manage projects effectively through experience. For this reason, some higher education institutions offering engineering training include in their programs training through projects, which is based on student production in an individual or group setting, whether at school or in companies. Some schools also offer entrepreneurship support programs aimed at giving future engineers the opportunity to develop an entrepreneurial spirit and to master managerial skills and project management tools. These programs make it possible to offer the support and accompaniment necessary for the professional success of the winners, if they wish to embark on the adventure and create their own projects. To conclude, the function of engineer has undeniably evolved in recent years to also integrate the managerial dimension. It has therefore become essential to focus on the importance

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- Accueil
- Ingenierie
- Informatique
- Management
- Comptabilité
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Formation ingénieur : Vers l'ingénieur manager, voire entrepreneur ? - Ecole d'ingénierie et d'ingénieurs au Maroc

Home / Ingenierie / Formation ingénieur : Vers l'ingénieur manager, voire entrepreneur ?

Formation ingénieur : Vers l'ingénieur manager, voire entrepreneur

L'évolution du marché du travail continue et les exigences des

recruteurs nécessitent un effort d'adaptation de la part des personnes souhaitant se démarquer par rapport aux autres candidats à la recherche d'emploi.

Le profil d'ingénieur est notamment concerné par ces changements. Les ingénieurs travaillant dans des équipes ou des entreprises opérant dans différents secteurs, prennent de plus en plus conscience de l'importance de se diversifier et d'enrichir leur formation d'ingénieur avec des compétences managériales.

Cette double compétence permet en fait à l'ingénieur d'exercer plus efficacement ses fonctions vu qu'il est amené de plus en plus à exercer une fonction de management au sein de l'entreprise. D'autre part, les compétences managériales lui seront également très utiles s'il souhaite se lancer dans l'entrepreneuriat.

A travers cet article, nous allons vous expliquer comment l'ingénieur est amené à exercer des fonctions managériales au sein de l'entreprise ou dans le cadre d'un propre projet, et comment l'intégration des soft skills dans les formations d'ingénieur lui permettent d'assurer cette fonction.

La gestion des équipes

En tant qu'ingénieur manager, vous serez amené à gérer des équipes, que ce soit dans le cadre du salariat ou de l'entrepreneuriat. Votre fonction consistera à fixer les objectifs, affecter les tâches aux membres de l'équipe, les motiver et les animer, chose qui nécessite un certain nombre de compétences organisationnelles et managériales.

Cependant, la formation d'ingénieur traditionnelle reste dans une grande partie des instituts de formation, centrée sur les connaissances techniques et pratiques tout en négligeant l'aspect relationnel et communicationnel qui sont considérés comme la pierre angulaire du succès au sein d'une équipe, voir même dans le milieu de travail.

Heureusement, certaines écoles supérieures d'ingénierie soucieuses de l'importance des soft skills chez les profils ingénieurs, commencent à intégrer les aspects du développement personnel dans leur programme de formation. Cela permettra non seulement de consolider la culture managériale des étudiants et de développer des compétences en communication, mais surtout de produire des ingénieurs ayant une personnalité affirmée, capables de travailler en équipes et d'occuper des postes de responsabilités, de vrais ingénieurs managers dont le monde a besoin !

L'organisation de l'activité et la gestion des projets

Pour les ingénieurs souhaitant évoluer, grandir et prendre la responsabilité des grands projets, les soft skills représentent désormais autant d'importance que les autres savoir-faire.

Peu importe le domaine où l'on opère, la gestion de projet implique d'avoir une capacité à organiser l'activité en planifiant et affectant les différentes tâches aux équipes concernées, puis en assurant un contrôle et suivi permanent.

Pour ce faire, certaines compétences humaines et managériales comme le sens de l'organisation, la gestion de conflit, la réactivité, la flexibilité, la gestion du changement, le leadership, la confiance en soi et le sens de la communication se montrent indispensables à la réussite dans sa fonction, notamment pour l'ingénieur manager. Ceci est valable également pour toute personne souhaitant se lancer dans l'entrepreneuriat et créer sa propre entreprise.

Cependant, on ne peut réellement apprendre à gérer efficacement des projets que par le biais de l'expérience. Pour cette raison, certaines écoles supérieures proposant une formation d'ingénieur intègrent dans leurs programmes la formation par le biais de projets, qui repose sur une production de l'étudiant dans un cadre individuel ou en groupe, que ce soit à l'école ou en entreprises.

Certaines écoles proposent également des programmes d'accompagnement à l'entrepreneuriat visant à donner aux futurs ingénieurs l'occasion de développer un esprit entrepreneurial et à maîtriser les compétences managériales et les outils de gestion de projet. Ces programmes permettent d'offrir l'appui et l'accompagnement nécessaires à la réussite professionnelle des lauréats, s’ils souhaitent se lancer dans l’aventure et créer leurs propres projets.

Pour conclure, la fonction d’ingénieur a indéniablement évolué durant ces dernières années pour intégrer également la dimension managériale. Il est donc devenu indispensable de mettre le point sur l’importance de faire le choix d’une école offrant une formation d’ingénieurs combinant savoir-faire technique, développement des soft skills des étudiants et aspect entrepreneurial, et ce, afin de valoriser les profils auprès des recruteurs et d’accroître les chances de ces futurs ingénieurs de réussir l’aventure entrepreneuriale si elle est visée.

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to **tshitaditshingombe**

ÉCOLE NATIONALE SUPÉRIEURE DES ARTS ET INDUSTRIES TEXTILES

- TAXE D’APPRENTISSAGE
- L’ENSAIT
- FORMATIONS
- CONCOURS
- ENTREPRISES
- INTERNATIONAL
- GEMTEX

L’ENSAIT souhaite renforcer la place de l’**entrepreneuriat** et de l’**innovation** dans la formation d’ingénieur, et consacrer une plus grande ouverture sur des **secteurs d’avenir**.
La fibre d’entrepreneuriale est liée à des qualités telles que la **vision à long terme**, la **créativité**, la **capacité à prendre des risques** etc., qualités qui sont essentielles dans toutes les situations professionnelles.
Il est donc important que tous les ingénieurs soient sensibilisés et soient en capacité de les développer dans leur formation. De la même façon, il s’agit plus particulièrement d’imprégner les étudiants de la **culture de l’innovation** au quotidien, notamment en développant plus d’activités pédagogiques de **mise en situation** en lien avec les **activités de recherche** des enseignants-chercheurs de l’Ecole.

Activités pédagogiques liées à l’innovation et à l’entrepreneuriat dans le cursus d'ingénieur

Entrepreneuriat

1ère année : Module « Culture d’entreprise »

Les étudiants abordent l'entreprise sous l'axe humain en repérant son mode d'organisation, son mode décisionnel et les interactions entre équipes et collaborateurs en vue d'adopter la posture professionnelle adéquate.

2ème année : Module « Stratégies des entreprises »

Ce cours participe à ce que l’élève ingénieur, en tant que futur manager, soit capable de collecter et d’exploiter des informations financières pertinentes pour l’aider dans ses missions, en particulier de décideur

3ème année : Filière parallèle « Création d’entreprise et entrepreneuriat » à l'Ecole Centrale de Lille

Plusieurs élèves ingénieurs de 3ème année (4 à 5 par an) participent chaque année à cette filière parallèle. Cette formation inter-écoles ambitionne de donner les clefs managériales à la création d’entreprises innovantes et de développer la propension à entreprendre chez les étudiants ainsi que leur Leadership.

3ème année : Projet de fin d'études | Création d'entreprises

Un contrat pédagogique est proposé aux étudiants entrepreneurs qui souhaitent travailler sur leur projet de création d’entreprise dans le cadre de leur projet de fin d’études. Les horaires et le lieu de réalisation du projet de fin d’études sont aménagés pour ces étudiants, ainsi que les modalités d’encadrement pédagogique

Innovation

2ème année : Projet « 30h pour innover »

Dans le projet « 30 h pour innover » que suivent les étudiants de 2ème année, ces derniers doivent par équipe de 5 ou 6, définir une application innovante sur la base d'apports scientifiques dans plusieurs domaines

3ème année formation classique : Projet « SPRINT »

Il s'agit d'un projet de 100 heures par groupe de 4 personnes dont l'objectif pédagogique est de concevoir un produit dans un contexte innovant. Chacun doit faire preuve d'initiative et d'une grande organisation pour gérer le projet du début jusqu'à sa réalisation et notamment commander le matériel, prévoir un modèle économique, répondre au cahier des charges, convaincre lors des levées de fond.

3ème année formation apprentissage : Projet « Innovation textile »

Les apprentis de 3ème année réalisent pour leur part, le Projet innovation Textile, dont la finalité est de développer un textile fonctionnel innovant

Des partenaires internationaux

Les partenaires de ce programme de formation sont :

- ENSTA Bretagne, Brest en France (formation en Français),
- Czech Technical University (CTU), Université de Prague (formation en Anglais)
- HAN University, Pays Bas (formation en Anglais).
- TU Chemnitz, Allemagne (Formation en Allemand, Programme UFA/DFH)

La première année dispense une formation équivalente sur les différents sites et la deuxième année une formation spécifique.

2 profils
au choix
- Architecture de véhicules
- Modélisation

A l'issue de la formation,

- **les étudiants du profil "Architecture des véhicules" sont capables de :**
    - Conduire et animer les études d'avant projets en lien étroit avec les partenaires, clients et constructeurs ;
    - Élaborer et définir des solutions techniques pour le projet véhicule ;
    - Modéliser différentes problématiques typiques d'un véhicule : dynamique du véhicule, motorisation y compris alternatives ou hybrides, transmission de puissance, … ;
    - Contrôler et assurer la « montabilité » des composants et des éléments mécaniques, électriques, électroniques, informatiques… ;
    - Établir la documentation présentant l'inventaire de solutions retenues et les risques associés en tenant compte des aspects qualité et fiabilité/ coût ;
    - Analyser, concevoir, réaliser, vérifier et intégrer la modélisation des systèmes thermo-dynamiques et la modélisation du contrôle commande associé ;
    - Intégrer les équipes de conception de systèmes complexes un utilisant les démarches et outils typiques de l'« ingénierie systèmes » ;
- **les étudiants du profil "Modélisation" sont capables de :**
    - Concevoir et/ou utiliser des outils de simulation pour le calcul scientifique ;
    - Résoudre des problèmes industriels par des méthodes d'approximations numériques
    - Réaliser des tests et analyser les résultats ;
    - Simuler des modèles pour validation des spécifications ;
    - Assurer une comparaison critique des résultats obtenus par simulations et par essais mécaniques
    - Analyser, concevoir, réaliser, vérifier et intégrer la

modélisation des systèmes thermo-mécaniques, de la pièce à la structure.

Les compétences nationales d'un master mécanique listées sur la fiche RNCP 34069 sont acquises par les étudiants diplômés du master mécanique de l'ENSTA Bretagne. Cependant, il faut noter que l'environnement pluridisciplinaire mentionné dans la fiche nationale (automatique, contrôle, sciences du vivant, sciences de la terre ...) est réduit aux véhicules terrestres pour le parcours automobile et aux plateformes navales et offshores pour le parcours génie maritime.

Découvrez l'organisation du cursus

Une intégration professionnelle réussie

Les méthodes d'enseignement alliant compétences techniques et gestion de projet (cours théoriques, travaux pratiques et projets) vous permettront d'être immédiatement opérationnel en sortie d'école dans :

- la conception des véhicules et des systèmes,
- la qualification des performances des systèmes automobiles,
- l’ingénierie mécanique au sens large.

Les diplômés de ce Master occupent des postes en ingénierie de conception, ingénierie de production, ingénierie d'affaires, R&D,...Cette formation offre également la possibilité aux étudiants qui le souhaitent de poursuivre en thèse.

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La finalité de cette formation est de sensibiliser et d'outiller les futurs ingénieurs pour leur permettre de prendre des décisions adaptées au contexte ...

People also ask

Quelles sont les études pour devenir ingénieur automobile ?

Quel formation pour travailler dans l'automobile ?

Comment intégrer une école d'ingénieur automobile ?

Quel bac pour devenir ingénieur automobil

Experiment 5 Measuring the magnetic field of an air coil

Students also viewed

- [Experiment 8 Measuring the band gap of a semiconductor](#)
- [Experiment 7 Thermoelectric Effect](#)
- [Experiment 6 Measuring the induction voltage in a conductor loop moving within a magnetic field](#)

- Experiment 4 Analysing the thermodynamic cycle of the heat pump using the Mollier diagram
- Experiment 1 Magnetic field outside a straight conductor
- Physics Practical on Determining speed of sound in air

Warning: TT: undefined function: 32
EXPERIMENT 5: Measuring the magnetic field of an air coil

Objectives - Measuring the magnetic field B of a long air coil as a function of the current I. - Measuring the magnetic field B of a long air coil as a function of the length L and the number N of turns of the coil.

Apparatus 3*coils, 1*high-current power supply, 1*teslameter, 1*axial B-probe, 1*multicore cable, 6-pole, 1 m long, 1*stand for coils and tubes, 1*saddle base

Experimental set-up

The equipment was set up as in diagram.~ The coil was laid on the stand for coils and tubes, with variable number of~ turns per unit length, and the high-current power supply was connected to it. The axial B-probe was connected to the teslameter by means of the multicore~ cable, clamped with the stand rod from the scope of supply of the probe, and aligned so that the Hall sensor (a) was positioned in the centre of the plastic body of the coil.

Experimental procedure Measuring as a function of the current I: The zero of the teslameter was calibrated with the key Compansation. A~ measuring range of 20 mT was selected at the teslameter.

Current I was enhanced in steps of 2A and the corresponding magnetic field B~ was noted. Before each new measurement current was turned back to 0A, and the teslameter set to zero. The experiment was repeated for other 2 coils.~

Theory - Biot-Savart law implies that the sum of contributions gives rise to the magnetic field B generated at the location P by an arbitrary conductor through which a current I is flowing. The sum is given by: dB = uo. I ds * r Eq. (I) 4 π r 2 r where uo = 4 π .10-7 Vs/Am r is the radius vector from the respective part of the conductor to the point P vector ds describes the length and direction of the individual parts of the conductor

- Calculating the total magnetic field calls for the computation an integral. Usually the integral is complex to do but relatively easier for conductors with certain symmetries where an analytic solution is obtained.
- For cases where the field of a long coil is calculated, Ampère's law (which also can be derived from Maxwell's equations) is very easier to use. Ampère's law: B. ds = mo. j = uo (II) where j: current density, IA: current through the area A, S: closed boundary curve of the area A
- A and S are chosen In order to calculate the magnetic field of a long coil. The magnetic field inside the coil is parallel to the axis of the coil If the coil is sufficiently long, and almost vanishes outside the coil, i., only on the part S 1 of the boundary curve S will a component of the magnetic field in the direction of the boundary curve be different from zero.
- Therefore we obtain B ds = mo. B ds B L (III) Where L: length of the part S 1
- also I A = N (IV) Where N: number of turns inside A, I: current through the coil
- thus

B = uo

□ □

- In this experiment, the magnetic field inside a long coil will be measured by means of an axial B-probe in order to verify the result (V). The probe contains a Hall sensor which is sensitive in the direction parallel to the axis of the probe.

Analysis of results

Using B = uo □ □

Plotting B against I gives us gradient m =

□□ N L

From graph 1:

m = □□ N L = 0.

□□ □ y intercept, b = -0

From graph 2:

m = □□ N L = 0.

□□ □ y intercept, b = 0

From graph 3:

m = □□ N L = 0.

□□ □ y intercept, b = 0

NB. For all the statistical calculations (standard deviations about regression, of the slope, of the intercept, etc) please refer at the back of graphs.

Discussion:

- The experiment investigated the effects on the induced magnetism of changing the current flowing at fixed length and fixed number of turns of the coil.
- For all the graphs y intercepts were so small for significant changes that it can be negligible.
- Therefore we would have B = mI. From which we can conclude that the magnetic field in a cylindrical coil is directly proportional to the current flowing in the coil.
- There were possible sources of errors: ▪ Random errors might have come from setting the current from the analog knob. ▪ The accuracy of the experiment dependent on the sensitivity of the Hall sensor. If it was not minutely sensitive then errors surfaced in the calculations. ▪ If there were other magnetic objects around then the magnetic field values measured were not entirely due to the coil.
- To reduce the errors, 3 experiments were done to compare the results afterwards. Since there were only slight differences therefore the experiment

can be considered valid. Also the very small standard deviations makes the experiment acceptable.

Conclusion

- The results take the form B = mI. We therefore conclude that the magnetic field in a cylindrical coil is directly proportional to the current flowing in the coil if the length of coil and the number of turns is fixed.

EXPERIMENT 5: Measuring the magnetic field of an air coil
Objectives
• Measuring the magnetic field B of a long air coil as a function of the current I.
• Measuring the magnetic field B of a long air coil as a function of the length L
and the number N of turns of the coil.
Apparatus
3*coils, 1*high-current power supply, 1*teslameter, 1*axial B-probe, 1*multicore cable, 6-pole, 1.5 m long, 1*stand for coils and tubes, 1*saddle base
Experimental set-up
~ The equipment was set up as in diagram.
~ The coil was laid on the stand for coils and tubes, with variable number of
turns per unit length, and the high-current power supply was connected to it.
~ The axial B-probe was connected to the teslameter by means of the multicore
cable, clamped with the stand rod from the scope of supply of the probe, and
aligned so that the Hall sensor (a) was positioned in the centre of the plastic
body of the coil.
Experimental procedure
Measuring as a function of the current I:
~ The zero of the teslameter was calibrated with the key Compansation. A
measuring range of 20 mT was selected at the teslameter.

Experiment 8 Measuring the band gap of a semiconductor

Physics II100% (11)

Experiment 7 Thermoelectric Effect

Physics II100% (7)

Experiment 1 Magnetic field outside a straight conductor

Physics II93% (15)

Experiment 8 Measuring the band gap of a semiconductor

Physics II100% (11)

Experiment 7 Thermoelectric Effect

Physics II100% (7)

- 8Experiment 1 Magnetic field outside a straight conductor

Company

Experiment Name: Verification of the Transformation ratio of the Transformers.
Objective: Determine the Transformation ratio of the Transformers.
:equipment Required
♣ Transformer Board.
♣ Single-phase AC Power Supply 230 V and 50 Hz.
♣ Regulating Transformer, Auto Transformer (0-250V).
♣ 2 Ammeters, range (1-10 A).
♣ 2 Voltmeters, range (0-500 V).
♣ 2 Wattmeters.
♣ Load (R = 1 kΩ).
Experiment Diagram:
Results Table:
Primary Side
Secondary Side
□
□ (V)
□□ (A)
□
□ (W)
□
□ (V)
□□ (A)
□
□ (W)
200
150
100
1
Page | 1
) Experiment No. (
Experiment Name: Determination of Efficiency and Voltage Regulation of a single-phase Transformer by direct loading.
Objective: Determine the Efficiency and Voltage Regulation of a single-phase Transformer by direct loading.
:equipment Required
♣ Transformer Board.
♣ Single-phase AC Power Supply 230 V and 50 Hz.
♣ 2 Ammeters, range (1-10 A).
♣ 2 Voltmeters, range (0-500 V).
♣ 2 Wattmeters.
♣ Load (1 kΩ).
♣ 1 Switch.
Experiment Diagram:
Results Table:
Primary Side
Secondary Side
□
□ (V)
□□ (A)
□
□ (W)
□
□ (V)
□□ (A)
□
□ (W)
2
) Experiment No. (
Experiment Name: Determining the no-load characteristics of the single-phase transformer.
Objective: Determine the no-load characteristics of the transformer in the TRANSFORMER BOARD as: □□□ □◆□□ □□.
:equipment Required
♣ Transformer Board.
♣ Single-phase AC Power Supply 230 V and 50 Hz.
♣ Regulating Transformer, Auto Transformer (0-250V).
♣ Ammeter, range (1-10 A).
♣ Voltmeter, range (0-500 V).
Experiment Diagram:
Connection circuit diagram of a transformer to determine the no-load characteristics.
Results Table:
No-load characteristics of the single-phase transformer
□
□ (V)
0
25
50
75
100
140
160
180
200
220

230
 (A)
3
) Experiment No. (
Experiment Name: Single-phase Transformer current and voltage ratios with different types of loads.
Objective: The object of this experiment is to measure the load current and the secondary voltage
 of a single-phase transformer with different types of loads.
:equipment Required
♣ Transformer Board.
♣ Single-phase AC Power Supply 230 V and 50 Hz.
♣ Resistive, Inductive and Capacitive loads.
♣ Ammeters, range (1-10 A).
♣ Voltmeters, range (0-500 V).
Experiment Diagram:
Results Table:
Transformer load voltage and current with different types of loads◆
 (mA)

 (V)
Load
 No-load
 Lamps (R)
 Inductive (L)
d Capacitive (C)
4
) Experiment No. (
Cage Rotor)-(Squirrel phase induction motor-
Operation of a three :Experiment Name
in star and delta circuit.
Objective: Operate the three-phase induction motor first in star and then in delta connection, find torque characteristics.
:equipment Required
♣ Three-phase Induction Motor (Type 2707)
♣ Brake Unit (Type 2719)
♣ Control Unit (Type 2730)
♣ Universal Power Supply (Type 2740)
Experiment Diagram:
Results Table:
2nd sub-
value
1st sub-
value
Min.
speed
Pull-out
torque
Rated
speed
No-load
speed
Characteristic points at
Nr (r.p.m)
T (N.m)
5
) Experiment No. (
Experiment Name: Efficiency, current and power factor of a three-phase Induction Motor.
Objective: Determine the characteristics for efficiency, current and power factor of a three-phase induction motor with squirrel cage rotor.
:equipment Required
♣ Three-phase Induction Motor (Type 2707).
♣ Brake Unit (Type 2719).
♣ Control Unit (Type 2730).
♣ Universal Power Supply (Type 2740).
♣ Power factor meter (10 A).
♣ Ammeter, range (1-10 A).
♣ Voltmeter, range (0-500 V).
Results Table:
2nd sub-
value
1st sub-
value
Min.
Speed
Pull-out
torque
Rated
speed
No-load
speed
Characteristic points at
Nr (r.p.m)
T (N.m)
(kW)
V (Volt)
I (A)
(kW)
η
6
Experiment Diagram:
Page | 7

AC 2007-1330: BUILDING A MODERN POWER ELECTRONICS AND ELECTRIC MACHINES LABORATORY

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Building a Modern Power Electronics and Electric Machines Laboratory

Abstract

This paper presents the development of the state of the art Power Electronics and Electric Machines Laboratory at Cleveland State University. This laboratory was designed as a part of newly developed power program that consists of three required courses in the undergraduate electrical engineering curriculum. Typically, Electromechanical Energy Conversion is the only one required power course in electrical engineering curriculum. To support the need of local industry in North East Ohio, two power courses, Power Electronics I and Electric Machines and Power Electronics Laboratory, have been added as required courses to undergraduate electrical engineering curriculum. With these changes, a new state of the art laboratory was designed and implemented, providing students with experiments related to all topics covered in two prerequisite courses, Electromechanical Energy Conversion and Power Electronics I. The laboratory experiments represent the unique blend of traditional and contemporary approach to learning electric machines and power electronics. Modular Lab-Volt equipment has been used for experiments related to steady state analysis of Electric Machines and transformers. In addition, modern software and hardware technology (DSPACE) has been used for experiments related to real time control of different types of electric machines. In addition, several experiments related to power-pole approach and average models designed for power electronics converters have been adopted from the University of Minnesota and incorporated into the laboratory course material.
The new laboratory has been working flawlessly since its inception in fall of 2004. This paper describes the set of laboratory experiments, assessment method as well as the survey from students who took the laboratory course.

Introduction

In 2001, Power Electronics and Electric Machines program was fully developed in electrical and computer engineering department at Cleveland State University. To support newly developed curriculum, state of the art Power Electronics and Electric Machines Laboratory has been established. The old Electric Machines Laboratory that consisted of line-fed motor generator sets has been completely dismantled and replaced with seven modern test benches.

This paper presents the construction of the newly developed laboratory along with the structure of the Power Electronics and Electric Machines program. It has been shown in literature that number of power electronics and electric machines laboratories use either modular Lab-Volt equipment [1] or integrative approach [2], [3], [4], [5] and [6]. Unlike the majority of power electronics and electric machines laboratories that have recently been renovated, the laboratory at Cleveland State University has been designed to take the advantage of both traditional as well as contemporary approach to teaching power electronics and electric machines. To support this idea, several experiments have been developed with modular Lab-Volt equipment as well as DSPACE equipment and have been combined with experiments adopted from the University of Minnesota. This unique combination of Lab-Volt, Power-Pole and DSPACE test benches helped us apply both contemporary as well as traditional method in teaching power electronics and electric machines. In addition, assessment method as well as student feedback is presented.

Power Electronics and Electric Machines Program

Typically, Electromechanical Energy Conversion is the only one required power course in electrical engineering curriculum. To support the need of local industry in North East Ohio, two power courses, Power Electronics I and Power Electronics and Electric Machines Laboratory, have been added as required courses to undergraduate electrical engineering curriculum. Figure 1 shows the structure of Power program in Electrical Engineering Department at Cleveland State University. All courses but the Power Electronics and Electric Machines Laboratory are four credit-hour courses and offered once a year. The Laboratory course is a two credit hour course.

Figure1. Structure of the Power Electronics and Electric Machines Program

Topics covered in Electromechanical Energy Conversion (EEC 361) and Power Electronics I (EEC 470) are shown in Tables I and II. These courses are prerequisites for Power Electronics and Electric Machines Laboratory (EEC 470) and Senior Design (EEC 490).

Table I. Course structure of Electromechanical Energy Conversion

No.	**Topics**	**Lecture (hours)**
1	Review of basic single/three-phase circuits	3
2	Review of rotational motion and magnetic field; The linear DC machine	6
3	Transformers: Ideal transformer; Real single-phase transformer	6
4	Introduction to AC machinery fundamentals	6
5	Synchronous generators: The speed of rotation; Internal generated voltage; Equivalent circuit; Phasor diagram; Power and torque	6
6	Synchronous motors: Basic principles of operation	6
7	Induction motors: Basic concepts; Equivalent circuit; Power and toque; Torque-speed characteristics	6
8	Introduction to DC machinery fundamentals	6

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Table II. Course structure of Power Electronics I

No.	**Topics**	**Lecture (hours)**
1	Introduction to Power Electronics	1
2	Semiconductor devices	2
3	Review of basic electrical concepts	4
4	Line-frequency Diode Rectifiers	5
5	Line-frequency Phase Controlled Rectifiers and Inverters	4
6	DC-DC Switch-mode Converters	4
7	PWM with bipolar and unipolar switching	4
8	Switch-mode DC-AC Inverters	4
9	Power Supply Applications	4
10	Motor Drive Applications	4
11	Computer Lab	9

A newly developed Power Electronics and Electric Machines Laboratory is strongly coupled with the power program requirements of Figure 1 and course structure of Table I and Table II. With the help of three modern facilities, Modular Lab-Volt equipment, Power-pole board, and DSPACE, all topics in the two prerequisite courses are covered in the Laboratory course as an efficient utilization and combination of these three totally different methods. The structure of Power Electronics and Electric Machines Laboratory is shown in Table III.

Table III. Structure of Power Electronics and Electric Machines Laboratory

No.	**Topics**	**Description**	**Equipment**
1	Transformers	Determination of transformer parameters by performing no load and short circuit test. Voltage Regulation and Efficiency.	Lab-Volt
2	AC/DC Rectifiers	Operation of Single-phase and Three-phase Diode/Thyristor rectifiers;	Lab-Volt Power-Pole
3	DC/DC Choppers	Introduction to DC/DC choppers: Buck, Boost, Buck-Boost choppers; Verification of output voltage versus duty ratio; The effect of switching control signal frequency; Measurement of the output power versus input power.	Lab-volt

Power-pole
4
DC/AC
Inverters
Variable voltage, variable frequency single – phase switchmode single-phase and three-phase inverters.
Lab-Volt
Power-Pole
5
Synchronous
Motors and
Generators
The effect of load changes on a synchronous motor;
The effect of field current changes on a synchronous motor;
The effect of load changes on a synchronous generator operating alone.
Lab-Volt
6
Introduction
to DSPACE
Mechanical systems modeling.
Example of building a real-time system through simulink and DSPACE.
Operation and control of DC machines by using DSPACE.
DSPACE
7
Induction
Motors
Determination of induction motor parameters.
Steady state performance at various torque loadings.
Control of induction machines
Lab-Volt
DSPACE

New Laboratory Workstations

Power Laboratory at Cleveland State University consists of three Lab-Volt test benches, four Power Board test benches and four DSPACE test benches.

Lab-Volt Test Benches

The Lab-Volt Power Electronics Training System is a versatile, flexible, modular, and complete teaching system [1]. It consists of all different types of modules including power supplies, power electronics circuits and variable-speed drive modules, AC and DC machines and transformers, wiring cables, control panels, power meters and various measuring instruments [2]. Lab-Volt test bench is shown on Fig.2.

Figure2. Lab-Volt Test Bench

Power-pole board Test Benches

The Power-pole boards shown on Fig.3 is a building-block-based power electronics reconfigurable circuit board which contains power-pole circuit as well as on-board isolated drive circuits, PWM generation, fault protection, output filter, and switched load [3]. The main feature of the Power-pole Board is the reconfigurable power-pole consisting of two MOSFETs and two diodes. The drive circuits for the MOSFETs are incorporated on the board, and so are the various protection circuits for over current and over voltage. PWM signals to control the MOSFETs can be generated onboard or supplied from an external source. The power-pole can be configured to work in various topologies using three magnetic boards which plug into the Power-pole board. In addition, there is an option of doing frequency analysis of each topology by injecting a smallsignal sinusoidal control voltage. The board can also be operated in voltage/current feedback mode using an external control circuit mounted on a daughter board which plugs into the Powerpole board [4].

Figure3. Power-Pole Board

DSPACE Test Benches

DSPACE DSP controller board shown on Fig.4 is an interface between the host computer, the driving circuit, and the motor drive system, including PWM inverters, transducers, serial interfaces, sensors, etc. One of the best features of the DSPACE package is the ease of building real-time applications [5]. DSPACE has a software interface to the controller board based on MATLAB-SIMULINK. Since SIMULINK is a block-oriented, graphical interface based simulation package that works within MATLAB environment, students do not have to write a code at all [6]. Once the model in SIMULINK is completed, DSPACE software can convert it into real-time DSP code. Then it downloads the code to the controller board, and execute the hardware in real-time. DSPACE software also has tools to display, store data, and change parameters.

In addition all test benches are equipped with Textronix oscilloscopes, voltage and current probes, power supplies, digital meters etc.

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Figure4. DSPACE Structure

Modular Lab-Volt Equipment which has been used for training purposes on number of industrial sites helps students understand the operation of each power electronics module but it does not expose them to actual industrial set-up. Therefore, it has been combined with Power-pole boards.

By using such well-designed and more industrial-style Power-pole board, students avoid many unnecessary difficulties in getting familiar with practical devices. In addition, traditional approach in teaching electric machines and drives should not be completely eliminated. Therefore, Lab-Volt equipment has been used as an introduction to steady state operation of different electric machines and transformers. Once students get familiar with steady state operation of electric machines and drives, they get exposed to contemporary approach by using DSPACE. After the procedure of getting acquainted with SIMULINK, students can build and operate a real-time motor drive system. DSPACE related experiments will allow students to observe and comprehend the operation adjustable speed drives.

According to TABLE III, Lab-Volt equipment and industrial Power-pole board are used for experiments 2, 3 and 4. Experiments related to DC/DC converters by using Power-pole board have been adopted from the University of Minnesota whereas the experiments related to AC/DC converters by using the Pwer-ole board have been developed at Cleveland State University.

According to TABLE III, Lab-Volt equipment and DSPACE test benches are used for experiments 5, 6 and 7. Experiment 6 is adopted from the University of Minnesota whereas experiment 7 has been developed at Cleveland State University.

The experiments related to DC/DC choppers in the laboratory course are partially adopted from those developed at the University of Minnesota.

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Teaching Method

The three-hour lab session starts with a 15 minute lecture followed by a 15minute quiz related to experiments covered that week. Students are given handouts in advance in order to prepare for quizzes and laboratory experiments.

Students have to submit written laboratory report every week. An instructor evaluates laboratory reports for technical accuracy. In addition, two of the reports are selected for a more comprehensive evaluation with numerical scores applied to content and writing skills. The report evaluation is shown on TABLE IV.

TABLE IV. Laboratory Report Evaluation Form

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In addition, students take a mid-term and final bench exam. All bench exams have been videotaped.

During the mid-term and final bench exam, demonstrations evaluation form, as shown in Table V, has been used to assess students' performance. It has been shown that the form was extremely useful and easy to use. Instructor can easily grade a bench exam by simply deducting points from each category such as: knowledge of fundamentals, use of bench equipment etc.

TABLE V. Demonstrations Evaluation Form

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Student Feedback

Students have responded very well to the new laboratory. Results obtained from laboratory course evaluations are shown on Fig.5. Lab-Volt equipment helps students understand the input output characteristics of each power electronics module without going into details how each module was actually designed. Once students get familiar with each module, and its input-output characteristic, they get introduced to Power-pole boards. Power-pole boards help students understand details of actual industrial design of power electronics converters. Likewise, students get introduced to the steady state operation of electric machines and drives by using Lab-Volt equipment prior to using it in combination with digital controllers and power electronics converters in DSPACE related experiments. DSPACE related experiments that used for digital control of electric machines turned out to be very interesting but yet abstract. Students complained that it took them a long time to learn how to use DSPACE before they applied it in the actual experiment.

Assessment methods used in this course have proved to be very efficient, especially mid-term and final bench exams. Students had to practice and review material related to assigned laboratory experiments. During their presentations, demonstrations evaluation form was used for grading different skills. Some students were uncomfortable during the mid-term exam but most of them improved by the time they took the final.

LABORATORY COURSE EVALUATIONS

5 is a maximum

3.4
3.6
3.8
4
4.2
4.4
4.6
Spring 2005 (Section 1)
Spring 1998 (Section 1)
Spring 2005 (Section 2)
Spring 1998 (Section2)
Fall 2005
Spring 2006 (Section 1)
Spring 2006 (Section 2)
Spring 2006 (Section 3)
NEW LAB
OLD LAB

Figure 5. Laboratory course evaluations

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Conclusion

The state of the art Power Electronics and Electric Machines Laboratory that has recently been developed provides an excellent opportunity for our students to learn Power Electronic and Electric Machines by using modern equipment. The unique approach to teaching the laboratory course by using traditional as well as contemporary approach resulted in enthusiastic and efficient learning process. The assessment methods stimulated the majority of students to efficiently apply their knowledge obtained in two prerequisite courses and greatly improve their writing and speaking skills.

Acknowledgment

Authors would like to thank NSF (award # 0410912), Nasa Glen Research Center and Fenn College of Engineering for supporting this project.

References

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The required boost inductance value can be obtained on the basis of the required boost inductor input ripple current, which is commonly computed as a percentage (10–40%) of the maximum input current to the boost converter. As given in the design specifications in Table 1, for a 15% ripple current, the inductor ripple current can be calculated as

$$IL\ ripple=0.15\times Iin\ max$$

(1)

where $I_{in\ max}$ is the boost converter maximum input current and can be calculated as

$$Iin\ max=2--\surd\times Po\square\times Vin\ min\times PF$$

(2)

where $V_{in\ min}$ is the minimum input voltage to the boost converter in V. η and PF are the target efficiency and power factor of the designed PFC stage, respectively.

Using Equations (1) and (2), the allowable ripple inductor current at full loading can be calculated. The boost inductor minimum value is calculated on the basis of this ripple current value and 0.5 of the value of the worst-case scenario of the boost converter duty cycle (D), as given below:

$$Lb\ min=Vbus\times(1-D)Fsw\times IL\ ripple$$

(3)

where F_{sw} is the switching frequency in Hz and V_{bus} is the DC bus voltage in V.

2.

To compute the average and maximum peak currents of the specified boost inductor, the boost converter used is assumed to work in the continuous current conduction mode (CCM), with two operation modes when the switch Q_b is on and off. Figure 3 depicts the boost converter’s inductor voltage and current waveforms in various operation modes.

Figure 3. Boost inductor voltage and currents waveforms of the employed PFC topology.

When the switch (Q_b) is closed in **Mode 1**, the energy is stored in the inductor and a magnetic field is generated. When Q_b is opened in **Mode 2**, the current circuit impedance rises, lowering the current, and the magnetic field previously created is reduced, allowing the current to flow toward the load. As a result, the inductor voltage polarity is reversed, putting the two sources in series and charging the DC bus capacitor (C_b) via the fast-switching diode (D_b).

The inductor maximum average current ($I_{Lb\ avg\ max}$) can be calculated at the rated power condition (P_o), the rated V_{bus}, and the minimum operating duty cycle ($D_{PFC\ min}$) as given below:

$$ILb\ avg\ max=PoVbu(11-DPFC\ min)$$

(4)

As shown in Table 1, the boost converter is designed to work with a wide supply voltage range (176–264) V. So, the PFC stage minimum duty cycle value can be calculated as

$$DPFC\ min=1-Vin\_maxVbus$$

(5)

The inductor ripple current $I_{Lbr\ pk}$ as the percentage (%Ripple) of the boost converter total input current can be expressed as

$$ILbr\ pk\ =\%Ripple\times ILb\ avg\ max\times 2$$

(6)

Therefore, the inductor maximum peak current is calculated as

$$ILb\ pk=ILb\ avg\ max+ILbr\ pk\ 2$$

(7)

3.

On the basis of the calculated inductance and the inductor maximum peak current, the inductor core part number, the number of turns (N), and the size of the winding wire have to be selected.

The boost converter inductor core was designed to have a high saturation level, which prevents saturation at the maximum peak current ($I_{L\ pk}$) and supports the converter operation with the designed switching frequency. The inductor core losses also have to be accepted in accordance with the temperature rise during the PFC converter operation. Therefore, Kool Mμ core materials, with low loss, a relatively high saturation level (10,500 gausses), a higher switching frequency level (up to 200 kHz), and near-zero magnetostriction (ability to expand or contract in response to a magnetic field), are good for eliminating audible frequency noise in in-line noise filters and inductors and also excellent for implementation in PFC circuits [26].

As depicted in Figure 4 chart, the inductor core in this work will be chosen by the LI^2 method. The core part number will be chosen from the Kool Mu chart of the Magnetic inc supplier [27], where L is the boost inductance value and I is the inductor maximum peak current.

Using the calculated value of LI^2 and the required inductance value from the chart and ensuring suitable space for the wire to wind around the core, the boost converter inductor is designed using two stacked Kool Mμ toroids core with part number 77083A7. The number of turns (N_{Lb}) in the inductor to obtain the required inductance value (L_b) can be calculated as

$$NLb=Lb2\ AL\_min-------\surd$$

(8)

where A_{L_min} is the minimum inductance factor for each core.

The inductor wire is chosen on the basis of the maximum peak current of the inductor and must be thick enough to keep the DCR low and be able to form the appropriate number of turns around the selected core area.

4.

> Power losses in the PFC boost inductors are caused by (i) the DCR resistance losses ($P_{Lb\ DCR}$) of the inductor wire and (2) the inductor core losses ($P_{Lb\ Core}$).

The DCR losses of the boost converter inductor ($P_{Lb\ DCR}$) can be calculated as

$$PLb\ DCR=ILb\ rms2\times DCR$$

(9)

where the designed inductor DCR value can be experimentally measured by applying DC current and voltage to the terminal of the inductor and using Ohm’s law to obtain the equivalent inductor terminal resistance and $I_{Lb\ RMS}$ is the inductor maximum RMS current and can be calculated as

$$ILb\ rms=Po\square\times Vin\_min\times PF$$

(10)

On the basis of the supplier of the chosen core, the core losses of the inductor ($P_{Lb\ Core}$) can be directly obtained from the core datasheet or calculated using the given equation:

$$PLb\ core=K1\times Fxsw\times By\times Ve\ \times10-3$$

(11)

where K_1 is constant for the core material, x is the frequency exponential, B is the peak flux density in Gauss, y is the flux density exponential, and V_e is the effective core volume in cm^3.

In this work, and based on the design analysis, the boost inductor was manufactured with 60 turns of 1.15 mm copper wire wrapped around the 2-stacked Kool Mµ 77083A7 toroid cores. The DCR value of the manufactured inductor was measured experimentally and found to be around 0.087 Ω. The electrical specifications of the designed boost inductor are summarized in Table 2.

2.1.2. DC Bus Capacitor

When selecting the output bulk capacitor (C_b) for a PFC boost converter, it is critical to keep the equivalent series resistance (ESR) as low as possible because it affects power efficiency and voltage regulation. A higher ESR causes more ripples, influencing the stability of the boost converter control loop [28]. Typically, aluminum electrolytic capacitors are used, which require a high-power density; moreover, due to their small volume, these capacitors are also preferred in PFC applications because they provide a high capacitance value with a low ESR.

The DC bus capacitor for PFC boost converters is typically designed with a value that must meet the specified DC bus voltage ripple (Vrpp) using Equation (12) and be sufficient to deliver the output minimum voltage hold-up with the specified time (t_{hu}), as given in Equation (13).

$$Cb\geq\ Po2\times\square\times Fmin\times Vrpp\times Vbus$$

(12)

$$Cb\geq\ 2\times Po\times thu(V2bus-V2bus\ min)$$

(13)

The output capacitor was designed using the larger of the two equations.

The capacitor RMS current ($I_{Cb\ RMS}$) across the 60 Hz line cycle is given as [29]

$$ICb\ rms=(82-$$
$$-\surd\times P2o3\square\times Vin\_min\times Vbus-P2oV2o)------$$
$$------------------\surd$$

(14)

The capacitor equivalent series resistance (ESR) is calculated on the basis of the dissipation factor (DF) of the chosen DC bus capacitor C_b at the low line frequency as

$$ESR=DF2\times\square\times F\times Cb$$

(15)

The ESR losses of the DC bus capacitor $P_{Cb\ ESR}$ can be calculated as

$$PCb\ ESR=ESR\times I2Cb\_rms$$

(16)

To reduce the equivalent ESR of the DC bus capacitor to reduce the power losses, the calculated capacitance value can be divided into n number of capacitors in parallel. In this work, the largest value of the DC bulk capacitor, calculated using Equation (12), was about 950 uF. So, two capacitors of 560 uF and 450 V, with a low ESR value, are used in parallel to reduce the effective ESR value and hence reduce the capacitor losses. The dissipation factor of the chosen capacitor is about 0.15, so the capacitor ESR is calculated to be about 0.355 Ω.

2.1.3. Mosfet Switch

To choose an optimal Mosfet (Q_b) for a boost converter implemented for PFC converters, there are some important Mosfet selection considerations, which can be summarized as follows: low on-state resistance (R_{dson}) for low power losses, fast turn-on/off switching to reduce device switching losses, low output capacitances to increase efficiency with light load conditions, high dV_{DS}/dt and high dI_F/dt to withstand the spikes and overshoots, and low thermal resistance to decrease thermal power dissipation [1,30,31].

To minimize conduction losses, the power Mosfet switches in PFC boost converters are chosen on the basis of the highest peak current considering the value of the on-state drain–source resistance (Rds_{on}). The RMS current ($I_{Qb\ RMS}$) and the highest peak current stress ($I_{Qb\ pk}$) in the boost converter switch Q_b can be calculated as [8]

$$IQb\ rms=PoVin\ min1-82--\sqrt{}Vin\ min3\square Vbus------------\sqrt{}$$

(17)

$$IQb\ pk=2--\sqrt{}\times IQb\ rms$$

(18)

In this work, considering the calculated switch's highest peak current, the maximum output voltage ratings, the low switch Rdson, and the IPZ60R040C7 switch is used for the PFC stage. The Rds_{on} of the chosen switch is about 40 mΩ.

The power losses in the Mosfet switch are classified into two parts, the conduction losses ($P_{Qb\ Rdson}$) due to the on-state resistance and the switching losses ($P_{Qb\ sw}$).

The conduction losses ($P_{Qb\ Rdson}$) of the switches can be estimated as:

$$PQb\ Rdson=I2Qb\ rms\times Rdson$$

(19)

For the chosen Mosfet switch, the output capacitance C_{oss} = 85 pf, the rise time t_r = 8 ns, and the fall time t_f = 0.2 ns of the Mosfet gate. Using these values, switching losses and losses due to the output capacitance ($P_{Qb\ sw}$) can be determined as

$$PQb\ sw=Fs[0.5\times Vbus\times Iin\ pk\times(tr+tf)+0.5\times Coss\times V2bus]$$

(20)

2.1.4. Boost Diode

In PFC boost converters, the boost diode (D_b) has a big influence on the system's performance due to the reverse recovery behavior. So, an ultra-fast diode with a low reverse recovery time (t_{rr}) and reverse recovery charge (Q_{rr}) is necessary to reduce the switching loss.

The boost diode peak current is calculated as the maximum load current at the minimum DC bus voltage, as follows:

$$IDb\ pk=PoutVbus\ min$$

(21)

The diode losses $P_{Db\ loss}$ are estimated on the basis of the forward voltage (V_f) at 125 °C and the reverse recovery charge (Q_{rr}) of the diode.

$$PDb\ Loss=Vf\times IDb\ pk+0.5\times Fsw\times Vbus\times Qrr$$

(22)

In this work, the silicon carbide (SiC) Schottky diode (with new diode technology) with part number IDH16G65C5 with a forward voltage of about 1.5 V and no reverse recovery/no forward recovery is used as the boost diode. As a result, the switching loss caused by this diode can be ignored and only the conductivity loss caused by V_f is considered.

2.2. Power Loss Distribution in the PFC Stage

Table 3 summarizes the design procedure results of the power components and power loss calculations in the employed PFC converter stage. Figure 5 depicts the loss distribution in the PFC stage power components. In the input bridge rectifier, the total power losses amount to about 36%, followed by the power losses in the boost inductor, by 30%, and the expected conversion efficiency, which is calculated from the proposed optimal design analysis of the designed PFC stage, is about 97.10%.

2.3. Boost Converter Average Small-Signal Model

Assuming that the single-phase boost converter unit employed in this work, as shown in Figure 6, is working in the continuous current conduction (CCM) mode, the mathematical equations that describe the change in the inductor current (I_{Lb}) and the DC bus voltage ($V_{bus} = V_o$) can be given as

$$dILbdt=VinLb-Vbu(1-D)Lb$$

(23)

$$dVbusdt=-VbusR\ Cb+IL(1-D)Cb$$

(24)

where D is the PFC boost converter duty cycle and R is the load resistance in Ohms.

We assume that at the selected operational points (i_{Lb}, v_{in}, v_{bus}, and d), all variables (I_{Lb}, V_{in}, V_{bus}, and D) are in a steady state when the AC signal variation is small (i_{Lb}*, v_{in}*, v_{bus}*, and d*), where

$$ILb=iLb+i*Lb\ ;\ Vin=vin+v*in\ ;\ Vbus=vbus+v*bus\ ;\ D=d+d*$$

(25)

To regulate the DC bus voltage (V_{bus}) and boost the inductor current (I_{Lb}), the designed control system must modify the duty cycle (D) on the basis of the variation in the small-signal AC.

Equations (26) and (27) are obtained by substituting values from Equation (25) in Equations (23) and (24).

$$(iLb+i*Lb)dt=(vin+v*in)Lb-(vbus+v*bus)(1-d-d*)\ Lb$$

(26)

$$(vbus+v*bus)dt=-(vbus+v*bus)R\ Cb+(iLb+i*Lb)(1-d-d*)Cb$$

(27)

Using the averaging model, which considers that over the switching period in the steady state the inductor current change and the capacitor voltage change are zero, Equations (26) and (27) can be rewritten as

$$(i*Lb)dt=1Lb(v*in)+vbus\ Lb(d*)-(1-d)Lb(v*bus)$$

(28)

$$(v*bus)dt=(1-d)Cb(i*Lb)+iLb\ Cb(d*)-1R\ Cb(v*bus)$$

(29)

Using Equations (28) and (29), the small-signal stability model for the bridge CCM PFC converter in the state space matrix is as follows:

$$[i.*Lbv.*bus]=⎡⎣⎢⎢0-(1-dLb)(1-dCb)\ -1R\ Cb⎤⎦⎥⎥[i*Lbv*bus]+⎡⎣⎢⎢1Lb\ VbusLb\ 0\ iLb\ Cb⎤⎦⎥⎥[v*ind*]$$

(30)

2.4. PFC Stage Control Circuit Design

Figure 7 shows the implementation of the control circuit for the boost converter, which consists of the outer voltage control loop to regulate the DC bus voltage and the inner current control loop to control the inductor current shape in order to allow the input supply current to follow the supply voltage for the high input power factor. The sensed DC bus voltage (V_{bus_fb}) is compared with the reference DC voltage (V_{ref}) to generate the DC error, which controls using a PI controller and then shapes with the sensed input voltage (V_{in_fb}) to generate the reference current for the inner current control loop.

A Laplace transform is applied for the small-signal stability model of the PFC converter obtained in Equation (30) to obtain the open loop transfer functions for the DC bus voltage and the inductor current control systems, as follows:

$$G(s)=v*bus(s)i*Lb(s)=Vin2\ Vbus\ Cbs$$

(31)

$$G(s)=i*Lb(s)d*(s)=VbusLb\ s+2VbusLbRCbs2+1CbR\ s+1LbCb(1-d)2$$

(32)

At a high switching frequency, the DC bus capacitor can be shorted and $1/C_b$ is equal to zero, which can simplify the inductor current open loop TF as given below:

$$Gi(s)\cong\ VbussLb$$

(33)

Figure 8 shows the block presentation of the closed loop TF in the voltage and current control loops of the boost converter of the PFC stage, where the closed loop TF of the outer voltage $G_{CLv}(s)$ and inductor current $G_{CLi}(s)$ control systems can be expressed as

$$GCL(s)=Vbus(s)Vref(s)=\ Vin2\ Vbus\ Cb.(KPv\ s+KIv)s2+Vin\ KPv\ 2\ Vbus\ Cbs+Vin\ KIv2\ Vbus\ Cb$$

(34)

$$GCL(s)=ILb(s)Iref(s)=\ Vbus\ Lb.(KPi\ s+KIi)s2+Vbus\ KPi\ Lbs+Vbus\ KIi\ Lb$$

(35)

After the transfer functions of the control loops are determined, the PI controllers’ gains can be designed with the standard form of the second-order system TF and bode plots by selecting the proper control system bandwidth and the undamped natural frequency that enhanced the optimal stability criteria for the closed loop of the voltage and current control systems.

Usually, the bandwidth of the outer voltage loop must be significantly small in order to eliminate the harmonics of the output DC voltage reflected by the AC input voltage at 60 Hz. On the contrary, the bandwidth of the inner current control loop must be significantly high compared with the voltage control loops to allow the inductor’s current to follow the reference current. In addition, the current control loop bandwidth must be less than the switching frequency (F_{sw}) to reject the noise at the switching frequency [8,32].

In this work, the undamped natural frequency (ξ) was considered to be about 0.707 and the closed loop bandwidths of W_n were assumed to be about 100 rad/s and 10 krad/s for the outer voltage and inner current loops, respectively. For the reliable operation of a controller under different loading conditions, the Kp and K_I parameters were set to work with the minimum value of the load voltage (V_{bus}) of 320 V with the rated input voltage.

Figure 9 depicts the bode plot of the frequency response of the closed loop voltage control system, which shows that the voltage controller offers unity gain for frequencies less than 32.7 Hz. This voltage controller works as a low-pass filter to remove the 60 Hz voltage ripple. In addition, the root locus plot of the pole-zero location, which shows the designed voltage control poles and zeros located on the left and the designed voltage controller, is inherently stable.

Figure 10 depicts the bode plot of the frequency response of the closed loop current control system, which shows that the current controller offers unity gain for frequencies less than 3200 Hz. This current control system, working as a low-pass filter, helps to remove the switching frequency noise. Moreover, the root locus plot of the pole-zero location, which shows the designed current control poles and zeros located on the left and the designed current controller, is also inherently stable.

3. Phase-Shift PWM ZVS DC–DC Converter Stage Design

Figure 11 shows the schematic circuit of the telecom phase-shift PWM ZVS DC–DC converter stage, consisting of three main parts: (1) the full bridge switching circuit on the primary side with phase-shift PWM and ZVS technique, which involves tuning the resonant inductor L_r to exhaust the energy of the parasitic capacitance of the switches at the moment of the switching, which offers current flow with zero voltage biasing, reducing switching losses and increasing the conversion efficiency, (2) the synchronous rectifier on the secondary side, which uses power Mosfets to rectify the output voltage of the HF transformer, and (3) the output LC filter to adjust the load voltage and current ripple contents and maintain the output voltage hold-up time at the specified values.

Challenges in designing high-power-density ZVS converters are (1) selecting primary Mosfets to withstand the high DC voltage on the input side with small conduction losses, (2) designing a resonant inductor that offers ZVS over a wide range of loading conditions, (3) selecting secondary Mosfets to withstand the high load current with small conduction and switching losses, and (4) tuning the output filter components to adjust the load voltage and current ripple components. The following sections present the design consideration, mathematical calculation, and loss analysis of the DC–DC converter stage of different power components.

Table 4 shows the design specifications of the employed phase-shift PWM ZVS DC–DC converter based on the LCU$^+$ telecom company for the 5G telecom power servers.

3.1. Phase-Shift PWM ZVS Converter Power Component Design and Manufacture

3.1.1. High-Frequency (HF) Transformer

Key parameters to be considered in the design of high-frequency transformers for DC–DC converters are as follows: effective (operating) duty cycle to calculate the transformer turn ratio; the magnetization inductance to realize ZVS; the shape, size, and material of the transformer core that reduce the oscillations; the number of magnets; elimination of eddy currents; and high dv/dt to withstand the overshoots and high voltage stress on the primary side [25,33,34,35]. Therefore, the design and manufacturing procedure of high-frequency transformers for high-power-density DC–DC converters can be summarized as follows:

1.

The transformer turns ratio (a) is calculated on the basis of the maximum operating duty cycle (D_{max}) at the minimum bus voltage rating of the converter ($V_{bus\ min}$), as follows:

$$a=NPNS=VPVS$$

(36)

Let D_{max} be about 70% and $V_{bus\ min}$ be about 320 V. The transformer turns ratio is calculated as

$$a=VPVS=(Vbus\ min-2VM)DmaxVload+VM=4.1$$

(37)

where V_M is the primary Mosfet switch voltage drop and it is assumed to be 0.5 V in calculations.

Let a = 5. The effective operating duty cycle (D_{eff}), also called the effective phase shift, is calculated as

$$Deff=(Vload+VM)a(Vbus-2VM)=0.675$$

(38)

2.

The transformer magnetizing inductance (L_m) is designed based on the maximum magnetizing inductance to realize ZVS as given [33,36]

$$Lm=Tdead\ a\ Vload\ minCHB\ Vbus\ min*(Ts\ min4-Tdead2)$$

(39)

where C_{HB} denotes the entire equivalent capacitance of the primary H bridge, which can be found on the primary switch datasheet. $T_{s\ min}$ is the minimum switching time, which is determined by the intended minimum switching frequency; T_{dead} is the PWM dead time, which may be computed using the effective duty ratio previously obtained.

3.

When selecting the transformer core size, shape, and material, the main considerations are its efficiency, temperature rise, operating frequency, eddy currents, and core losses. For high-frequency applications (10 kHz–3 MHz), iron powder cores, amorphous steel cores, and ferrite cores can be used. However, ferrite cores serve as efficient insulators to prevent eddy currents and experience low core loss. When choosing the core, it is also possible to begin with a core weight (W_e), a core effective volume (V_e), or a core effective area (A_e) based on the transfer power and switching frequency and choose which core will be most appropriate in these terms.

In this work, the ferrite core supplied by TDK [36], with a PQ shape and an effective area of about 200 mm^2, is considered excellent for the DC–DC converter switching frequency (f_{sw} = 100 kHz) and high-power density. For acceptable core losses, usually, the transformer magnetic flux should be maintained at a low level (0.1–0.4 Tesla). Therefore, we limit the maximum magnetic flux (B_{max}) to 0.35 Tesla, and consequently, the number of primary turns (N_p) is calculated as

$$NP=Vbus\times Deff2\times Bmax\times Ae\times fSW=19.10\ Turns$$

(40)

Using an HF transformer with 20 turns of the primary winding, the operating maximum magnetic flux is calculated to be about 0.336 Tesla.

4.

Three main losses in the transformer have to be calculated: the core losses, the primary copper losses, and the secondary copper losses.

- For the ferrite cores, the transformer core losses can be calculated as [37]

$$Ptr\ core\ loss=0.036\cdot(fsw103)1.64\cdot(10\cdot Bmax)2.68\cdot Ve\cdot 103$$

□ (41)

□ The primary winding RMS current and the copper losses due to the primary winding resistance (R_p) can be calculated as

$$Ip\ rms=Iload2\times a$$

(42)

$$Pp\ loss=I2p\ rms\cdot Rp$$

□ (43)

□ The secondary winding RMS current and the copper losses due to the secondary winding resistance (R_s) can be calculated as

$$Is\ rms=Iload2\times 2\ Deff-----\surd$$

(44)

$$Ps\ loss=2\cdot I2s\ rms\cdot Rs$$

- (45)

3.1.2. Input Capacitor Design

The DC–DC converter’s input capacitor is estimated to match the hold-up time (t_{hold}) for the minimum input voltage ($V_{bus\ min}$) given to the converter circuit [16,38].

$$Cin\geq 2Pload\ hold\square(V2bus-V2bus\ min)$$

(46)

The RMS current and the power losses due to the ESR of the input capacitor of the DC–DC converter stage are calculated as

$$ICin\ rms=Ip\ rms2-(PloadVbus\ min\times a)2\ -------------------\surd$$

(47)

$$PCin\ ESR=ICin\ rms2\cdot ESRCin$$

(48)

3.1.3. Primary Mosfet Selection

To choose optimal Mosfet switches for the high-voltage side of the isolated phase-shift PWM ZVS DC–DC converters implemented for high-power-density applications, the following are some important considerations:

- Low on-state resistance (R_{dson}) for low power losses.
- Fast turn-off switching and higher gate plateau voltage.
- Low gate charge Q_g and low capacitance at the output C_{oss} for designs with a wider ZVS range and less deadtime.
- High dV_{DS}/dt and high dI_F/dt to withstand spikes and overshoots.
- Low thermal resistance to decrease thermal power dissipation.
- Body diode with a high reverse recovery rate. The reverse recovery condition occurs when the body diode of a power Mosfet is switched from on-state to off-state while a current is flowing. The drain–source voltage rises rapidly as a result of this.

The RMS current of the primary Mosfet can be calculated as

$$IP\ Mos\ rms=Iload2\cdot\ 1a\cdot\ 12{-}{-}\surd$$

(49)

The primary Mosfet conduction losses at 150 °C is

$$PP\ Mos=IP\ Mos2\cdot Rdson$$

(50)

With the design of the converter with ZVS, the turn-on losses and the losses due to the output parasitic capacitance C_{oss} are zero and only the turn-off losses are considered.

$$PP\ Mos\ off=0.5\ IP\ pk\ Vbus\ toff\ fsw$$

(51)

In this work, according to the Mosfet design considerations, the voltage, and the current design requirements of the employed power supply, the Mosfet with part number IPW60R070CFD7 from the Infineon company, with a considerably small R_{dson} (about 70 mΩ at 250 °C and 0.13 Ω at 150 °C), low Q_g (about 67 nC), and considerably low C_{oss} (about 53 pF), is used for the full bridge switches on the primary side of the DC–DC converter stage.

3.1.4. Secondary Mosfet Selection

In the high-power density telecom applications, the secondary current stresses in the DC–DC converter are high, causing high conduction losses in the secondary switches. Thus, to have balanced switching and conduction losses, synchronous rectifier switches on the secondary side must have a considerably low R_{dson}.

The secondary switch conduction losses can be calculated as

$$PSR\ MOS=ISR\ Mos2\cdot Rdson$$

(52)

where $I_{SR\ Mos}$ is equal to the transformer winding secondary current.

The secondary switch switching losses can be calculated using Equation (20), where the voltage stress of the secondary switches can be calculated on the basis of the effective duty cycle and the load voltage.

$$PSR\ Mos\ swit=fs[0.5\times VloadDeff\times ISR\ pk\times(tr+tf)+0.5\times Coss\times(VloadDeff)2]$$

(53)

According to the specifications of the load voltage and load power, the Mosfet with part number IPP110N20N3, with extremely low on-resistance R_{dson}, of about 10.70 mΩ, is optimally designed for the synchronous rectification for the AC–DC switched mode power supplies and is selected in the synchronous rectifier switches.

3.1.5. Load Filter Inductor Design

The filter inductance value L_f is designed on the basis of the specified ripple current ΔI_{Lf} as a percentage of the full load current (15%), as listed in the design specifications in Table 4. Applying KVL at the secondary circuit of the DC–DC converter stage, the value of the filter inductance can be calculated as

$$Lf=Vloa(1-Deff)\Delta ILf*fSW$$

(54)

The load filter inductor maximum peak current ($I_{Lf\ pk}$) can be calculated as

$$ILf\ pk=Iload+\Delta ILf2$$

(55)

Using the LI^2 method to select the inductor core from the Kool Mu chart as shown in Figure 12, the single-core Kool Mμ with part number 77493 was chosen for the load filter inductor design. The number of turns (N_{Lf}) to obtain the required inductance value (L_f) can be calculated as

$$NLf=Lf\,AL\_min−−−−−−\surd$$

(56)

The copper loss ($P_{Lf\ DCR}$) of the winding wire due to the inductor DCR can be calculated on the maximum value of the RMS inductor filter current ($I_{Lf\ RMS}$) given as

$$ILf\ rms=(PloadVload)2+(\Delta ILf3−−\surd)2−−−−− −−−−−−−−−−−−−\mathfrak{R}\setminus\mathfrak{I}\mathfrak{I}$$

(57)

$$PLf\_Loss=ILf\ rms2\times DCR$$

(58)

The core losses of the load filter inductor can be calculated using Equation (11), given in calculations of the boost inductor core losses of the PFC stage.

In this work, to design an inductor that can withstand the peak current of about 39.80 A, a load filter inductor (L_f) of 30 uF was manufactured with 16 turns of three-wire copper 1.15 mm in diameter around the Kool Mμ 77439A9 toroids core, which also reduces the equivalent DCR value by increasing the wire’s cross-section area. The manufactured load filter inductor DCR value was experimentally measured, and it was about 0.0029 Ω.

3.1.6. Load Filter Capacitor Selection

The load filter capacitor value (C_f) is calculated on the basis of the hold-up time (t_{hold}) and the required voltage ripple (V_{Ripple}) as follows:

$$Cf\geq 0.9Iload*tholdVRipple$$

(59)

where the hold-up time (t_{hold}) is calculated as the time required for the load filter inductor current to reach 90% of the full load current [8].

$$thold=Lload*0.9IloadVload$$

(60)

The load filter capacitor RMS current is calculated as

$$ICf\ rms=\Delta ILf3−−\surd$$

(61)

The load filter capacitor value calculated from Equation (59) is about 3300 uF. To reduce the ESR value of the load filter capacitor, 3300 uF capacitance is divided into seven units of electrolytic 470 uF capacitors with DF of 0.1 at 63 V, in which the equivalent ESR is decreased by a ratio equal to the number of units. The ESR of the chosen capacitor unit is about 0.56 Ω, the equivalent resistance (ESR_{Cf}) of the output filter capacitor is about 0.08 Ω, and the output filter losses due to the equivalent ESR can be calculated as

$$PCf\ ESR=ICf\ rms2*ESRCf$$

(62)

3.1.7. Resonant Inductor Design

The quantity of energy required to achieve a ZVS condition is used to calculate the size of the resonant inductor tank. As a result, the energy absorbed by the resonant inductance (L_r) and transformer leakage inductance (L_{lk}) inductor values must be able to exhaust the energy given by the parasitic capacitance of the primary switches (C_{oss}) as well as the energy from the transformer winding capacitance (C_w).

$$12I2P\ rm(Lr+Llk)\geq 43CossV2bus+12CwV2bus$$

(63)

The leakage inductance of the designed HF transformer is measured on the primary side, and it is about 1.9 uH. The transformer winding capacitor is measured, and it is about 0.90 nF. Using these values, the resonant inductor to realize the ZVS on the primary side can be calculated.

The peak current of the resonant inductor is calculated as

$$ILr\ pk=ILf\ pka$$

(64)

As shown in the chart in Figure 12, the core for the resonant inductor can be selected on the basis of the LI^2 value. The resonant inductor number of turns and power losses can be calculated using the procedure given in the design of the load filter inductor.

In this work, the resonant inductor (L_r) with a value of 31 uF was manufactured with 22 turns of the single-wire copper 1.15 mm in diameter around the Kool Mµ 77120A7 toroids core. The manufactured load filter inductor DCR value was experimentally measured, and it was about 0.013 Ω.

Table 5 summarizes the electrical specifications of the designed load filter and resonant inductors for the isolated phase-shift PWM ZVS DC–DC converter stage.

3.2. Power Loss Distribution in the DC–DC Converter Stage

Table 6 summarizes the design procedure results of the power components and power loss calculations in the employed phase-shift PWM ZVS DC–DC converter stage. The power loss distribution in the stage of different components is also shown in Figure 13. The secondary synchronous rectifier switches are responsible for the highest power losses due to the high current stress. The expected conversion efficiency, calculated from the analysis of the designed phase-shift PWM ZVS DC–DC converter stage, is about 97%.

3.3. Control Circuit Implementation of the Phase-Shift PWM ZVS DC–DC Converter

By phase shifting the switching pulses of one half-bridge with respect to the other, the phase-shift PWM approach is used to control the full bridge on the primary side of the DC–DC converter. In this part, the ZVS approach is used to provide high-power-density efficient conversion at a high switching frequency. This control section can employ either voltage-mode or current-mode control techniques. Current-mode-controlled DC–DC switching is popular because it is more efficient than voltage mode control. However, when the duty cycle of the PWM rises above 50%, the current-mode architecture can become unstable [38]. The converter primary current slope compensation technique is used to mitigate this instability and restore stability across a large duty-cycle range [39,40].

Figure 14 shows the control strategy of the voltage and current control loops in the DC–DC converter stage implemented in the PSIM software to control the primary and secondary switches of the employed phase-shift PWM DC–DC converter stage.

The feedback signals in this control system are the primary current and the load voltage. To obtain a primary current signal (V_{Ip}), a current transformer with a turn ratio of 100:1 is used to sense the primary current, which is then sampled by a resistor. A load voltage signal (V_{load_fb}) is also sensed. To compensate for the instability of current waveforms at high duty cycle values, a 200 kHz ramp signal is added to the V_{Ip} signal to generate the primary current (I_p). In the voltage control loop, the load voltage feedback signal (V_{load_fb}) is compared with an appropriate reference value (V_{ref}) and passed to the voltage PI controller to generate the primary current reference value ($I_{p\text{-}ref}$). Then, the primary current (I_p) is compared with the reference value ($I_{p\text{-}ref}$) to generate the duty cycle required for the phase-shift PWM (PS-PWM) and the synchronous rectifier PWM (SR-PWM) generators to generate the operating pulse for the primary and secondary switches from Q_1 to Q_6.

4. Simulation Results and Discussions

Figure 15 depicts the overall system structure, as well as the proposed control strategy for the two-stage AC–DC telecom power supply, which was modeled in PSIM software to evaluate the power supply's performance with the optimally designed control loops and the designed power component values (given in Table 3 and Table 5) in both the PFC and phase-shift PWM ZVS DC–DC converter stages. As illustrated in the schematic of the PFC stage in Figure 2 as mentioned in Section 2, the EMI filter in the input side of the PFC stage is implemented as a CLC filter with a common-mode (CM) inductor of L_{cm} = 2.2 mH and capacitors of C_1, C_2, and C_3 of 1 uF.

To test the performance of the optimally designed PFC stage current control loop, with a rated supply voltage of 220 Vrms, 60 Hz, and a full loading condition of 2 kW, Figure 16 shows the waveforms of the boost inductor current, the reference current, the supply voltage, and the current, as well as the supply input power factor. The designed control loops succeed in making the inductor current follow the reference current, which reduces the phase difference between the supply voltage current waveforms to less than 5 degrees and offers an input supply with a minimum power factor of about 99.540%.

To test the dynamic performance of the optimally designed PFC stage voltage control loop to regulate the DC bus voltage to the specified value (400 V) with the specified ripple contents (15 V_{rpp}) for the wide range of the operating supply voltage, with different supply voltages (minimum voltage = 176 Vrms, nominal range = 220 Vrms, and maximum voltage = 264 Vrms), the DC bus voltage and the supply voltage are simulated as shown in Figure 17. The figure shows that the designed PFC stage voltage control loop has successfully regulated the DC bus voltage to the specified voltage level with specified ripple limits and with different supply voltages, from 176 to 264 Vrms.

Figure 18 shows the voltage and current waveforms of the switches Q_1 and Q_3 in the two legs of the full bridge on the primary side of the phase-shift PWM DC–DC converter stage. For the current waveforms to be clearly observed, they must be multiplied by 20 and show that the designed phase-shift PWM controller and the resonant inductor with the designed value on the primary side of the converter are sufficient to offer switching operation with ZVS in the two legs of the full bridge of the primary side of the DC–DC converter. In addition, Figure 19 shows the ZVS conditions in the voltage and current waveforms of switches Q5 and Q6 in the synchronous rectification circuit of the secondary side of the designed converter.

Figure 20 shows the AC supply, the DC bus, load voltage/current waveforms, and ripple content measurements. With 220 Vrms, and with a full loading condition of 2 kW, the DC bus voltage is regulated to the specified voltage level with a ripple peak-to-peak value of about 12 V, and the designed LC filter on the output load side of the phase-shift PWM converter maintains the load voltage ripple at about 13.5 mV and the load current ripple at about 20 mA, which is lower than the specified ripple contents for the load voltage and currents.

To demonstrate the total harmonic distortion (THD) in the supply input current, with 220 Vrms and full loading conditions, a fast Fourier transform (FFT) analysis of the supply input current is performed as shown in Figure 21. The analysis shows that the supply current fundamental component of about 13.10 A at 60 Hz and the third harmonic current of about 0.578 A at 180 Hz appear in the frequency spectrum and the total harmonic distortion (THD) measured is about 4.52% for the supply current waveform of the designed AC–DC telecom power supply.

The power loss budget of the different power components was estimated using the PSIM simulation model of the designed two-stage power supply at a full loading condition of 2000 W, as given in Table 7. The efficiency of both stages, as well as the overall efficiency of the designed two-stage power supply, were calculated, where the designed power supply offers an overall efficiency of around 94.50%, and the total full load power losses are around 111.50 W. The PFC stage has a power loss of approximately 6.50 W with a 97.20% efficiency, whereas the DC–DC converter stage has a power loss of approximately 55 W with a 97.25% efficiency.

5. Experimental Verification and Discussions

As shown in Figure 22, the printed circuit board (PCB) for the two-stage 2 kW AC–DC power supply for the outdoor telecom power servers is designed and fabricated using OrCAD capture and PCB design software 17.4 (Cadence, Rochester, USA) using the optimally designed and manufactured components of the

PFC and the phase-shift PWM DC–DC converter given in Table 3 and Table 5.

The UCC28180 CCM PFC controller is used to control the PFC stage, which has a switching frequency of about 100 kHz. The UCC28950 IC from Texas Instruments also provides 4-PSPWM signals with a switching frequency of 100 kHz for the switches on the primary side and 2-SRPWM for synchronous rectification at the switches on the secondary side, as well as primary current compensation to restore current stability and voltage loop control to adjust the output voltage to the specified value to control the DC–DC converter switches. Using the design tools of the IC UCC28180 in the PFC stage, the biasing resistor and capacitor values of the controller's pins can be scaled on the basis of the same optimal design specifications of the voltage and current control loops derived based on the small-signal modeling and optimal stability criteria and used in the simulation section.

Figure 23 shows the photograph of the experimental setup used for testing the fabricated power supply. The 3 kW DC electronic load from KIKUSI is connected to the load terminals to test the loading condition of the designed power supply. The voltage-current of the supply, the DC bus, and load terminals, as well as the THD, the PF, and the conversion efficiency of the designed power supply, are tested under different loading conditions and compared with the results obtained from the simulation process.

With the light loading conditions of 500 W and 750 W, the experimental performance of the designed AC–DC power supply is investigated as given in Figure 24. As shown in Figure 24a, with a 500 W loading condition, the designed PFC stage current control loop offers an input current with a PF of about 99.00% and a THD level of about 6.57%. The designed voltage control loop in the PFC stage regulates the DC bus voltage to the specified value of about 400 V, and the voltage control loop with the inserted designed LC filter in the load side of the DC–DC converter stage regulates the load voltage at about 54.5 V with a ripple voltage of less than 35 mV. As shown in Figure 24b, when the load power increased to about 750 W, the DC bus and the load voltages were still at constant values, the PF of the designed power supply increased to about 99.45%, and the THD value was about 5.96%.

The performance of the designed AC–DC power supply is also investigated with high loading conditions of 1250 W and 2000 W, as shown in Figure 25. The designed power supply offers an input PF of about 99.55% with a THD of about 5.15% when the loading condition is about 1250 W, as shown in Figure 25a. At the full load condition of 2000 W, the input PF is about 99.35% and the THD is about 5.50%, as shown in Figure 25b.

With 220 Vrms and different loading conditions (20%, 40%, 60%, 80%, and 100% of the full loading condition), the input and output power of the designed power supply is measured using simulation and experiment and the efficiency curve is depicted as shown in Figure 26. The minimum efficiency of the designed power supply is measured experimentally at 20% of the full loading condition, and it is about 92.10%. The maximum efficiency is about 94.10% at 80% of the full loading condition, and the efficiency at the full loading condition is about 93.15%. At the full loading condition, the total losses of the designed power supply were measured with experimental tests of about 137 W, where the PFC stage introduces a power loss of about 63 W and the phase shift PWM DC-DC converter stage introduces a power loss of about 74 W.

The error in the efficiency from the analytical analysis and from the simulation is calculated as a percentage of an exact experimental efficiency result. The proposed analytical analysis of the two-stage power supply provides efficiency calculation with an error of about 1.10%, and the error in the efficiency calculated from simulation modeling is about 1.72%. These error percentages present the power losses which are not considered in our design in this step, such as the thermal power losses of the magnetic parts, the heat sink, the power losses in the gate drives, and both controllers' Ics.

The supply power factor (PF) and supply current THD values are measured through simulation and experimental tests using 220

Vrms and different loading conditions (20%, 40%, 60%, 80%, and 100% of the full loading condition), as shown in Figure 27. It is observed that the designed power supply THD value measured from simulation and experiment is less than 8% at the 20% to 100% loading condition and about 5.50% at the full loading condition. Furthermore, the supply PF is greater than 99% at 20% to 100% loading conditions and about 99.35% at the full loading condition.

Table 8 shows the performance comparison between the designed two-stage AC-DC power supply with the commercialized power supply used for the telecom server power applications; all the cited power supplies worked with a universal input voltage range, and the PF, efficiency, and THD values were measured at full loading condition and rated input voltage range. It is noticed that the proposed design for the two-stage AC-DC telecom power supply offers conversion with a high power density and maintained the PF, efficiency, and THD values at the higher values required for the telecom server applications as compared with the commercialized two stages of AC-DC power supplies.

6. Conclusions

In this paper, the design procedure, analysis and optimal control strategy of a two-stage isolated 2 kW AC–DC telecom power supply is proposed, where the PFC current and voltage control loops are designed on the basis of an appropriate stability criterion that offers an experimental input supply with a PF of more than 99% and a THD of less than 6.5% for different loading conditions (20% to 100% of the full loading condition). Furthermore, the optimal design analysis, considerations, and manufacturing techniques of the magnetic parts, as well as the selection methodology of the switching elements in both stages, are proposed; they offer a switching operation with the ZVS technique, a reduction in conduction and switching losses in both stages, and offer PFC and isolated phase-shift PWM ZVS converter stages with about 97% efficiency. Moreover, the printed circuit board (PCB) of the designed 2 kW AC–DC telecom power supply is designed and fabricated. An isolated AC–DC industrial power supply with a power density of about 2 kW, a full-load efficiency of about 93.15%, a full-load PF of about 99.35%, and a THD of about 5.5%, suitable for 5G telecom power servers and data centers, is achieved in this work.

In future work, the design of the voltage, current, and power monitoring systems in the design of telecom power supplies will be carried out using a DSP microcontroller unit (MCU) that is designed to manage the operation of PFC and phase shift PWM controllers in both stages, with the shutdown of PWM signals for both stages occurring when unnormal conditions such as overvoltage and overcurrent are presented. In addition, for the establishment of protection systems for thermal and overheating concerns, a fault diagnosis technique based on the reliability and lifetime estimation study of power supply semiconductor parts will be conducted.

Author Contributions

Design and application—The literature review and manuscript preparation, as well as the simulations, were carried out by A.H.O. Experimental results and implementation of the prototype were carried by A.H.O. and J.B. Final review of manuscript corrections was carried out by J.B. All authors have read and agreed to the published version of the manuscript.

Funding

This research was funded by grant (RS-2022-00142883) from Ministry of Land, Infrastructure and Transport of Korean government.

Conflicts of Interest

Dr. Kourosh Sedghi ECE 410 Laboratory Manual
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ECE 410L
Electrical Machines and Energy Conversion
Laboratory Manual

Dr. Kourosh Sedghi ECE 410 Laboratory
Manual
2

An Electrical Machines and Energy Conversion Laboratory Manual

Second Edition

by

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Dr. Kourosh Sedghi ECE 410 Laboratory Manual

4

Preface

This manual is meant for students at the junior and/or senior level enrolled in an electrical engineering program. Students should have had calculus and ordinary differential equations courses. Ideally the students should have taken an electromagnetic course, if not, then, the second college physics should suffice. This textbook manual became an idea after several years of teaching, researching, consulting and studying the area of electrical machines.

Our student population has changed dramatically. The classic methods of learning and teaching have changed as well. The main reason for all this, in my judgment, is the introduction of computers in our everyday life and professional life as well. We have reached the point that if it cannot be simulated, then it is not possible to have a correct answer. Partially, faculty has created this situation with the encouragement in the use of simulation packages since the very first courses in the electrical engineering program. This is not all bad. With the right direction we can use those simulations as corroboration of the experimental results obtained by pure "brain power."

In technical areas such as electrical machines, the material has become classic. Only recently we have experienced the revival of this area due to the expansion of power electronics and motor control, adjustable speed drives, space exploration and industrial control

The intent of this manual is to bridge the gap between lecture, homework, design projects and simulation. We bring a unique way to teach this material and that is that in each lab we have a "hands on" experiment that must be done from beginning to end in a way that industry would have it done. Also, we are attempting to create each experiment as a "stand alone" lab in a way that practicing engineers and students alike can self-study the material.

Finally, our ultimate goal is to have the students realize that there is a level of thinking required to learn this material. Once they reached this level, the material becomes fun an easy.

Acknowledgements

This manual is an updated version of the previous Lab Manual prepared by Professor Bruno Osorno. Author would like to thank Professor Osorno who wrote the first edition of this manual at 2005. This manual is prepared based on the new equipment in the lab and feedback from generations of students that took those courses and went through the pain to learn the material without a manual and had to rely in my handwritten notes.

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2. Three Phase Power and Power Factor Measurement

3. Air core and ferromagnetic hysteresisloop

4. Open circuit and short circuit tests intransformers

5. Equivalent diagram, %VR and η of transformers

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7. Three-phase transformers

8. Synchronous impedance

9. Synchronizing with the system and loading the synchronous generator (%VR)

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11. Synchronousgenerator (Three-phase Multifunction Machine)

12. Three phase induction motors (Start-delta functionality)

- Part I: Set up and star-delta comparison
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13. DC Shunt motors: Set up-connections, Rotation reversal, Speed Control, Load Characteristic

14. Separately Excited DC generator: Load characteristics, Voltage control, and Voltage polarity

15. APPENDIX 1 Matlab tutorials

LABORATORY SAFETY

The students' acceptance of safety and health as part of every project will be enhanced if an atmosphere is created in which they feel free to correct each other and to point out deficiencies on the part of the faculty and staff directly to them. It must be absolutely clear that students have the right and the responsibility to identify unsafe actions, procedures or conditions without jeopardizing their grade in the laboratory or any other course.

Recommended General Safety Rules:

The following safety rules are recommended for general use. The Laboratory Director may modify this list to meet specific requirements. Electrical shocks can kill or maim an individual instantaneously. Therefore, extreme care must be taken when working with electrical equipment and circuits.

1. "Horseplay" is hazardous and will not be tolerated.
2. No student may work alone in the laboratory at any time so that in case of an emergency there will be someone to be able to call for help as well as disconnect the power supply to the bench.
3. All students should be familiar with the locations of all power supply switches.
4. An electrical circuit should never be energized before it has been completely wired and rechecked. The power supply should be disconnected before any changes are made to a circuit.
5. When taking meter readings of an energized circuit, use only one hand. This eliminates an arm-chest-arm path for current to flow. Current levels of a few milliamperes flowing through the heart can be lethal.
6. Shoes must be worn in the laboratory. Preferably, the shoes should be rubber soled or with electrically insulated soles.
7. All students should make certain that their hands and work areas are dry before beginning any laboratory exercise.
8. Do not work on a wet floor.
9. Shirts or blouses are required in the laboratory.
10. Each student must know the use and location of all first aid and emergency equipment (including fire extinguishers) in and near the laboratory room(s).
11. Be certain of the conditions of the equipment and the dangers present before working with a piece of equipment.
12. Worn or frayed extension cords or those with broken connections or exposed wiring must not be used. All electrical devices must be grounded before they are turned on.
13. Never relay on safety devices such as fuses, relays, interlock mechanisms, grounding wires to protect you.
14. Never remove a grounding prong of a three wire input plug.
15. Do not work on a cluttered bench. Place bookbags and coats/jackets on safe locations away from the circuits and equipment.
16. No portion of a student’s body, hair, or clothing should come in contact with any part of an energized circuit.
17. You must concentrate on the tasks at hand, and irrelevant conversations are discouraged.
18. No deviation from approved equipment operating procedures is permitted.
19. All laboratory aisles and exits must remain clear and unblocked.
20. The instructions on all warning signs must be read and obeyed.

21. Good housekeeping must be practiced in the laboratories, shops, and storage areas. Eating, drinking, use of all tobacco products, gum chewing, and application of makeup are prohibited in the laboratories, shops, and storage areas.
22. Glass breakage and malfunctioning instruments or equipment should be reported to the Teaching Assistant or Laboratory Director immediately.
23. All injuries, accidents, and "near misses" must be reported to the Laboratory Director.
24. No tools, supplies, or any other items may be tossed from one person to another.
25. Casual visitors to the laboratory are to be discouraged and must have permission from the Teaching Assistant or Laboratory Director to enter. All visitors and invited guests must adhere to all laboratory safety rules. Adherence is the responsibility of the person visited.

LAB #1 “FARADAY’SLAW”

INTRODUCTION

The objective of this experiment is to demonstrate Faraday’s law. We will observe in the oscilloscope the voltage induced in a coil by a magnetic flux. This voltage is the result of the movement of a magnet next to a coil.

PROCEDURE A

(1) Connect the diagram shown below
(2) Set your oscilloscope to observe the alternating signal.

Hint: Use the X-Y mode, First press trigger source and the press x-y plot button.
(3) Move the permanentmagnet back and forth in front of the coil.
(4) Take a snapshot from the scope screen and include it in your report.

COIL
OSCILLOSCOPE
N
S
PERMANENT MAGNET

Figure 1.1

PROCEDURE B

(1) Connect the diagram shown below.

(2) Apply approximately $v(t) = 20\cos(377t + \varphi)$ [volts] to coil number 1. (Use the single-phase AC output in power supply. First measure the output voltage and then apply to the coil.)

(3) Using the oscilloscope measure the voltage induced in the coil. Find the frequency of the signal.

(4) Insert the iron core (plunge) and observe what happens to the voltage.

V(t)
OSCILLOSCOPE
COIL 2
COIL 1

Figure 1.2

REPORT

(1) Copy and paste your snapshot photos taken from signals generated in your oscilloscopes screen. Indicate what they are.

(2) In part A. What happens to the voltage induced and its corresponding frequency when you move the magnet faster and closer to the coil? Is the frequency a function of the rate of change of flux (speed)?

(3) In part B. What happens to the voltage induced when you separate the coils even more? Is the frequency affected by the separation?

What happened to voltage and frequency when you put the coils closer together than before? Why?
What happens to the voltage and frequency when you insert the plunge? Why?
Elaborate on your conclusion using the relevant electromagnetic equations.
(4) Explain the use of Faraday’s Law in part A and in part B of this experiment. Be explicit.

LAB #2

“THREE PHASE POWER AND POWER FACTOR MEASUREMENT”

INTRODUCTION

The objective of this experiment is to measure and calculate active power, reactive power and power factors for three phase resistive, inductive and capacitive load banks.

PROCEDURE PART A

(1) Connect the circuit shown in the diagram below. Connection to Lucas_Nuelle Wattmeter is shown in the gray box for the Y balanced load.

(2) Apply about 10 to 15 volts rms, then measure line-line voltage, line current, power factor and three phase active/reactive power for three different load cases as below in Y connection

Run your experiment for three different loadcases:
(a) Mainly Resistive.
(b) Mainly Capacitive.
(c) Mainly Inductive

(3) Repeat experiment number (2) for delta connection.

REPORT (for each load)

1. Create a table with two major columns for Experimental vs calculated results.
2. Include all calculations based on the resistor, capacitor and inductor power factors
3. Calculate and compare the power factor in two different ways.
4. Calculate and compare the $Q3\varphi$ two different ways.
5. Calculate and compare the $P3\varphi$ two different ways.

3-phase power
supply
0-240 Vac
A
V
LOAD
LOAD
n
B
LOAD
C
A

LAB #3

"AIR-CORE AND FERROMAGNETIC HYSTERESIS LOOP"

INTRODUCTION

The objective of this experiment is to demonstrate the physical existence of "hysteresis loops" in air and iron cores. We will use a single phase transformer to obtain the iron core hysteresis loop, and a pair of coils to obtain the air core hysteresis loop.

PROCEDURE PART A: (air core**)**

(1) Connect the diagram shown in Figure3.1 with air core.
(2) Apply AC voltage (approx. 20volts)
(3) Put second coil together with the firstone.
(4) Adjust oscilloscope until the flux and current curves appear.
(5) Use X-Y channel to obtain the hysteresisloop.

COIL 1 COIL 2
RC INTEGRATOR
CH. 1 CH. 2
OSCILLOSCOPE
AC
voltage supply
R
Voltage channel
AIR-CORE CIRCUIT
Figure 3.1

PROCEDURE PART B: (iron core**)**

(1) Connect the diagram shown Figure 3.2 with iron core.
(2) Apply approximately 100volts.
(3) Repeat steps 4 and 5.

Current channel
COIL 1 COIL 2
RC INTEGRATOR
CH. 1 CH. 2
OSCILLOSCOPE
AC
voltage supply
R
Voltage channel
Current channel
IRON-CORE CIRCUIT
Figure 3.2

REPORT

(1) Draw, approximately, the signals generated in your oscilloscope. Indicate what they are. Be thorough.
(2) In part A.Why is the hysteresis loop linear? What does the slope mean?
(3) In part B. Why is the hysteresis loop nonlinear?
(4) What is the main harmonic content (other than the fundamental) in the current signal?
(5) What is its frequency?
(6) Identify, approximately, the voltage at which saturation of the iron occurred.

Dr. Kourosh Sedghi ECE 410 Laboratory
Manual
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LAB #4

“OPEN CIRCUIT AND SHORT CIRCUIT TESTS IN TRANSFORMERS”

INTRODUCTION

In this lab experiment we are going to obtain the values of the parameters of the *approximate* equivalent diagrams of transformers.

PROCEDURE PART A: (open circuit test)

(1) Connect diagram in Figure 4.1.
(2) Start applying voltage from 0 to approximately 120 volts.
(3) Obtain readings for; *Poc* , *Ioc* , *Voc* and then turn off the voltage supply.

Ampmeter WATT METER
+ -
A
+ -
-
v(t) V + Volt meter +
-
OPEN
Figure 4.1

PROCEDURE PART B: (short circuit test)

(1) Connect the diagram in Figure 4.2.
(2) Start applying voltage from 0 to approximately 10% of the rated voltage.
(3) Obtain readings for
Psc, Isc , *Vsc* and then turn off the voltagesupply

Amp meter WATT METER
+ - A
+ -
-
v(t) V + Volt meter +
-
Figure 4.2
OPEN

13

REPORT

In your report, be sure to include all the calculation details as well as the followings (**in table form**):

(Show all calculations step by step)

(a) Open circuit power factor.
(b) Excitation current.
(c) Magnetizing current.
(d) Open circuit admittance.
(e) Magnetizing reactance.
(f) Resistance of the core.
(g) Equivalent impedance.
(h) Equivalent reactance.
(i) Short circuit power factor.
(j) Draw two approximate equivalent diagrams with as much information as you can. One referred to the primary, and the other referred to the secondary.

TABLE 1 (OPEN CIRCUIT TEST) POC [W]	IOC [A]	VOC [V]	RC [Ω]	$X\ m$ [Ω]	$I\Phi$[A]	IC [A]	Im [A]	cos ΦOC (Leading or Lagging)

InsTrain
Multimedia Installation Lab
For electrical
wiring installation
Training in electrical wiring techniques
using the “InsTrain” system
InsTrain project partners:
Qualifications through Quality
Practical skills with equipment

Recent developments in career structures in the electrical industries and the changes in emphasis during training mean that practical skills are carrying more and more weight in the sphere of education. A combination of new training media and experiment systems is now playing an increasing role here. Independent learning models where students gain knowledge working on their own and at their own pace provide an optimum basis for teaching skills that last.

Close to real life

In the development of this equipment, Lucas-Nülle have worked together with the leading manufacturers of instruments and software. This means the Lucas-Nülle’s InsTrain system provides for highly realistic experience. Trainees using InsTrain always use authentic and up-to-date equipment and the latest data sheets.

2

Installation of information technology systems
•
Intra-building office communications
•
Wiring installation training panel

“Communications Technology“
page 8
Installation of electrical wiring circuit
•
with primary or sub-distribution boxes
Testing of safety systems
•
Wiring installation training panel
“Circuits for lighting and appliances“
page 6, 12
Independent learning by means of projects
InsTrain allows for whole curricula to be taught by means of
projects, which students can undertake in relatively indepen dent
fashion. Instructors can accompany the projects and provide
practical assistance if students are unable to progress with the
knowledge they have already gained
.
Working with InsTrain
The InsTrain Multimedia Installation Lab consists of models
organised by topic and represented by the various training
panels for electricians to learn wiring installation and system
infrastructure.
They possess a built-in interface and a universal fault simulator which works with PC software to allow for interactive
learning.
Multimedia, animated training modules guide students through
the theory and practical experiments. This allows them to work
independently, although instructors still have the freedom to
intervene at any time and modify the panels to match the needs
of the students.
This means that the training can be adapted to the needs of each
individual student, thus allowing practical skills to be learned on
an individual basis.
Lucas-Nülle
Selection and installation of building installation
•
components
Wiring installation training panel
“Building management systems using KNX/EIB“ page 10
Source: Hager (www.e-volution.de)
3
Mains feed to a building (service entry box)
•
Protective safety measures as per DIN VDE 0100 Part 610
•
Wiring installation training panel
“Building mains feed“
page 4, 13
4
PC interface, educational software and fault simulator
The wiring installation training panel
“Building mains feed” concerns how a building’s electrical system is connected to a mains supply
provided by an energy company and the procedures for installing and testing such a building wiring system according to standards.
Practical experiments are an integral part of the course.
A fault simulator incorporated into the hardware allows for various measurements to be performed by trainees in order to determine
what faults have occurred. Mains distribution, a service entry box and customer installations are all emulated in detail along with the relevant protective safety systems. Apart from the emulation and detailed explanations of the individual protection measures for a mains system, the course also covers testing of such equipment, checking individual components and making the relevant measurements.
Wiring Installation Training Panel
“Building mains feed”
Wiring installation training panel
“Building mains feed”
Lucas-Nülle
Training contents
Mains feeds, energy distribution
•
Measures for protecting against electric shocks
•
Mains systems
•
Short-circuit, short to body, short to earth
•
Testing of electrical installations according to modern
•
standards
Testing of TN/TT systems
•
Testing of RCDs
•
Insulation measurements, earth measurement,
•
loop resistance measurement
Testing of rotating fields, testing of protective earth,
•
measurement of equipotential bonding

Lightning and overvoltage protection
•
How conventional and electronic electricity meters
•
work
14
Lucas-Nülle
From Concept to Completion
Wiring installation training panel including teacher licence for CAD software
A software package for complete planning of building installations is included as a supplement to the educational software package for all wiring installation panels. It encompasses electrical wiring, bathroom fittings, heating systems, air conditioning and ventilation. The CAD design featuring modern systems allows for components to be matched up in virtual rooms.
Trainees work with the latest software, as used in practice.
Benefits to you
Technical databases
•
Graphic user interface under Windows 2000, 2003, XP, Vista
•
Network and multi-user capability at project level
•
Intelligent topic-based menu design with easy-to-use zoom functions
•
Multiple windows for an unlimited number of drawings and views (2D, 3D, zoom)
•
Manufacturer-independent project management with automatically completed programmable title field
•
Floor plan 2D
/ 3D
2D
/ 3D installation plans
15
Lucas-Nülle
Continuity tester
Functions:
Voltage testing
•
Optical and acoustic continuity indicators
•
Rotating field direction indication
•
Single pole test for phase identification
•
Polarity indicator
•
Torch
•
Test probe protector
•
Voltage display (with or without battery)
•
Enhanced display with 12 LEDs
•
Phase
•
LM 8554
Equipment tester conforming to DIN VDE 0701-0702
The test meter is for testing and measurement of recently maintained
or modified electrical equipment.
It includes the following:
Mains plug
•
PE indicator lamp
•
Touchpad
•
Mains socket
•
Test plug
•
4-mm connector sockets
•
LCD fault display
•
Required measuring accessories
•
Housing with carry handle
•
LM 8553
Measurement and Testing
Quality and reliability
Installation tester conforming to DIN VDE 0100 Part 600
The model provided by Gossen Metrawatt is a battery-driven
test meter for electrical wiring installations.
It is designed for the following measurements:
Voltage and frequency
•
Circuit breaker trigger delay
•
Insulation resistance and circuit
•
breaker trigger current
Continuity
•
Earth resistance
•
Loop and line resistance/impedance
•
Phase

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Qualifications Through Quality

Training Systems for Electrical Power Engineering

Advances in technology ...

The transition in the energy industry away from coal, oil and nuclear power towards renewable energy sources is gaining momentum. Today, technology is so advanced that solar energy, wind power, hydrogen power and biomass can be exploited as environmentally friendly energy sources.

In order for this trend to continue, well-trained technicians and specialists are needed all over the world.

In the wake of so-called intelligent (smart) power grids, people all over the world are talking about power generation, transmission and distribution as well as the protection of power engineering facilities and the economic exploitation of energy.

... are having a huge impact on training and education

Now, the Lucas-Nülle training system on power engineering gives instructors the opportunity to demonstrate and convey the technological context of power engineering to students in a graphic and practice-oriented fashion.

Electrical power engineering includes the areas of power generation, transmission, distribution and electrical energy utilisation as well as safety protective measures used in these areas.

The system is so extremely versatile that it can be adapted to fit all of the wide-ranging training requirements applicable to skilled workers, technicians or even engineers.

Your benefits

- Comprehensive, well-rounded program – spanning power generation and distribution techniques all the way to energy usage and consumption
- Integration of renewable energies into conventional power engineering
- System monitoring and controlling using SCADA (Supervisory Control and Data Acquisition)
- Modularly designed experiment panel system for the stepby-step, experiment-based exploration of system interdependencies
- Bus structure of all voltage levels permits rapid and transparent experiment setup
- Realistic simulation model of a 380-kV transmission line with 300-km and 150-km sections
- Use of conventional industrial components in cutting-edge digital technology
- High work-safety standards through the exclusive use of safety sockets and safety connecting leads
- Protective technology measures for all areas of power engineering

4

Lucas-Nülle

Manuals

Manuals provide, in addition to detailed descriptions of the experiments, also numerous projects, examples, exercises and solutions.

Project-based Training Media – Adaptable to any Training System

Multimedia courses

Many experiment instructions are available in the form of multimedia courses. This permits direct access to the measurement results of many different instruments. The multimedia courses contain:

- Questions to monitor knowledge level and learning
- Interactive experiment setups
- Navigation bars
- Animated sections devoted to theory

Animated Presentation of Complex Training Contents

From Power Generation Through to Consumption

Extremely high voltage

High voltage

The Smart Electrical Power Grid of the Future

Using the Lucas-Nülle equipment sets, it is possible to model an entire power supply grid from power generation all the way to ultimate consumption.

Nuclear power plant
Coal-burning power plant
Industrial centre
Industrial power plant Medium-load power plant
Substation
Hydroelectric power plant

Low voltage

Wind

Description Matériel didactique Électrotechnique de base hautes performances Équipement théorique d'entraînement électri

ZE3301 Didactic Equipment Electrotechnique de base hautes performances Electrotechnique de base Matériel d'entraînement électrique

1 Aperçu du produit

1-1 Vue d'ensemble

1. L'aide pédagogique électrique adopte une conception avancée et le panneau expérimental peut être remplacé librement. Les étudiants peuvent le remplacer en fonction des besoins de formation.

2. Les instruments expérimentaux sont à affichage numérique avec une grande précision. L'alimentation et les instruments utilisés dans cet appareil sont équipés d'un système fiable de protection des personnes.

1-2 caractéristiques

1. Applicable à l'enseignement de "Théorie fondamentale de l'ingénierie électrique" et "Technologie électrique". Grâce à ses bonnes capacités d'extension, le formateur peut être étendu à d'autres contenus de formation tels que "Technologie de contrôleur de logique programmable" et "Commande de fréquence variable de moteur".

2. L'avant de la planche de test suspendue est dessiné avec des schémas et des symboles, et l'autre côté est soudé avec les pièces connexes. Les composants qui doivent être mesurés ou observés utilisent un connecteur de verrouillage. Le circuit expérimental adopte la conception en mode circuit unitaire. Chaque circuit unitaire est basé sur le circuit de base. En connectant différents composants ou en combinant différents circuits, les étudiants peuvent mettre en pratique différents contenus de formation sur le formateur.

2 paramètres de performance

(1) Puissance d'entrée: système triphasé à

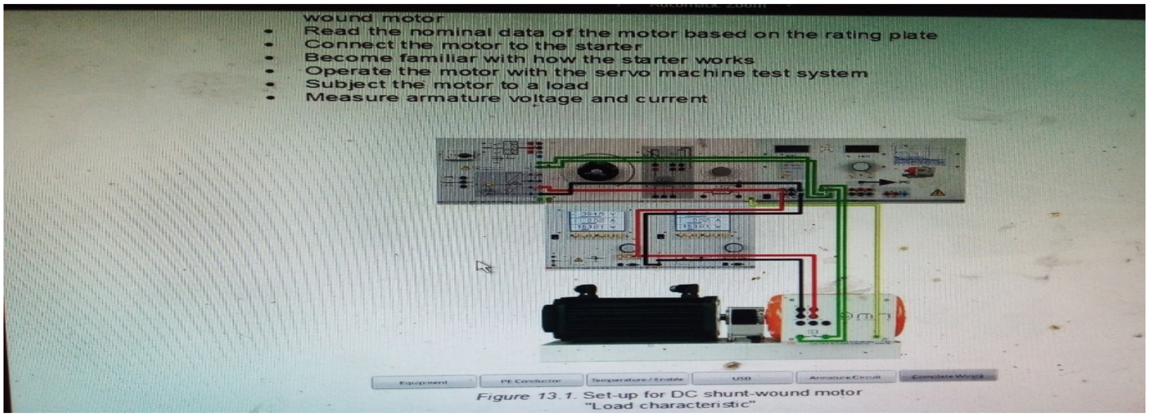
cinq fils 380V ± 10% 60Hz
(2) Dimensions: 1600mm × 800mm × 1500mm
(3) capacité de la machine: <2KVA
(4) Poids: <250 kg
(5) Conditions de travail: température ambiante -10 ° C ~ +40 ° C Humidité relative <85% (25 ° C)
4 liste d'expériences
Expérience 1 Utilisation d'instruments électriques de base et calcul des erreurs de mesure
Expérience 2 Méthode de réduction de l'erreur de mesure du compteur
Expérience 3 Loi d'Ohm
Expérience 4 Extension de la gamme d'instruments
Expérience 5 Cartographie des caractéristiques volt-ampère de composants de circuits linéaires et non linéaires
Expérience 6 Détermination du potentiel et de la tension et tracé de la carte de potentiel de circuit
Expérience 7 Vérification de la loi de Kirchhoff
Expérience 8 Vérification du principe de superposition
Expérience 9 Transformation équivalente d'une source de tension et d'une source de courant
Expérience 10 Vérification du théorème de Thevenin et du théorème de Norton

Test 11 Détermination des paramètres équivalents d'un réseau actif à deux terminaux
Expérience 12 Détermination des conditions maximales de transmission de puissance
Expérience 13 Test de réseau à deux ports
Expérience 14 Théorème de réciprocité
Expérience 15 Étude expérimentale de sources contrôlées VCVS, VCCS, CCVS, CCCS
Expérience 16 Observation et mesure de signaux électriques typiques
Expérience 17 Test de réponse du circuit RC du premier ordre
Expérience 18: Étude de la réponse d'un circuit dynamique de second ordre
Expérience 19: Détermination des caractéristiques d'impédance des composants R, L et C
Expérience 20 RC, test de caractéristiques de réseau de sélection de fréquence parallèle T double
Expérience 21: Recherche sur les circuits résonants des séries R, L, C
Expérience 22 RC réseau de sélection de fréquence dual T
Expérience vingt-trois Etude des trajectoires de phaseurs dans les circuits des séries RL et RC
Expérience 24: Caractéristiques des composants R, L, C et détermination des paramètres AC
Expérience 25 Mesure des paramètres du circuit alternatif
Expérience 26 Étude sur le phaseur d'un circuit alternatif sinusoïdal en régime établi
Expérience 27 Essai des caractéristiques du transformateur à noyau de fer monophasé
Expérience 28: Détermination de la polarité d'enroulement du transformateur
Expérience 29 Vérification d'un compteur d'énergie monophasé

Expérience 30 Mesure du facteur de puissance et de la séquence de phases

Expérience 31: Convertisseur d'impédance négative

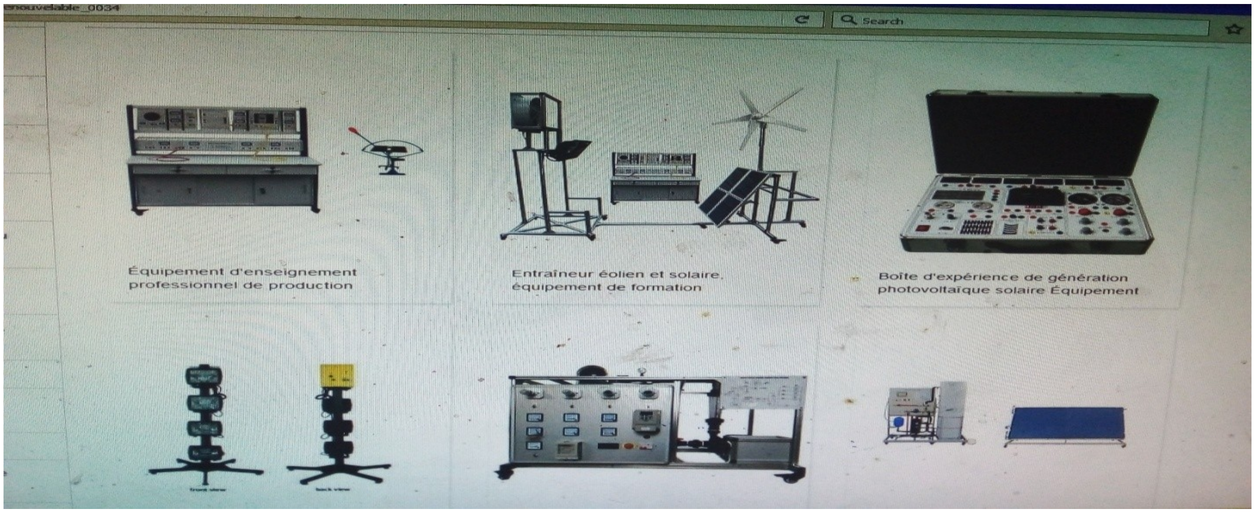
Expérience trente-deux gyrator



wound motor

- Read the nominal data of the motor based on the rating plate
- Connect the motor to the starter
- Become familiar with how the starter works
- Operate the motor with the servo machine test system
- Subject the motor to a load
- Measure armature voltage and current

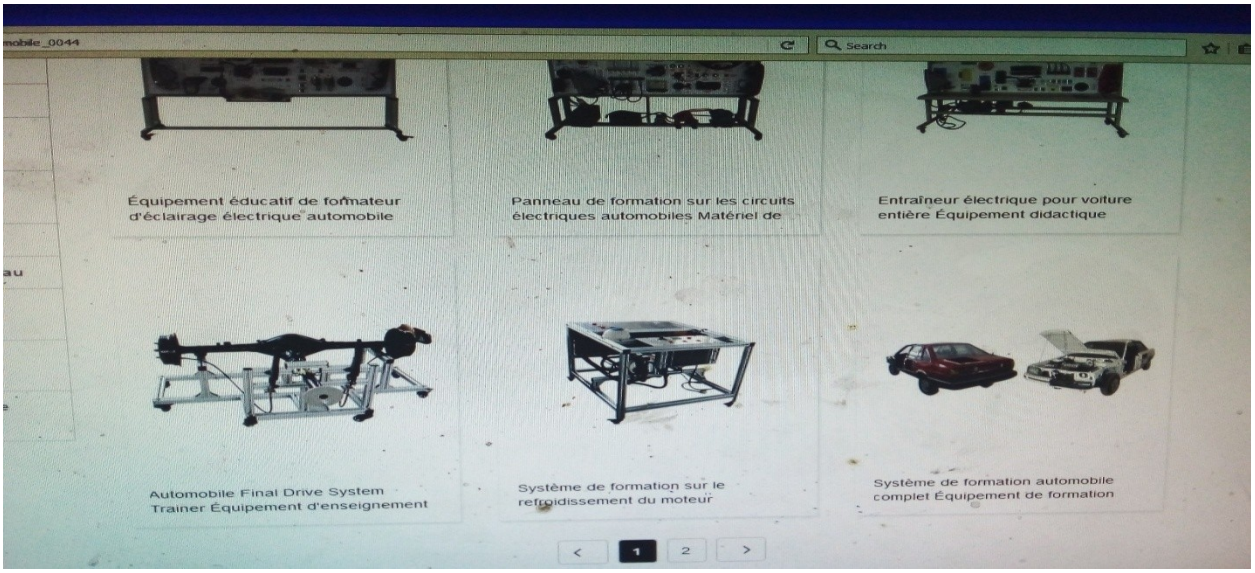
Figure 13.1. Set-up for DC shunt-wound motor "Load characteristic"



Équipement d'enseignement professionnel de production

Entraîneur éolien et solaire, équipement de formation

Boîte d'expérience de génération photovoltaïque solaire Équipement



Équipement éducatif de formateur d'éclairage électrique automobile

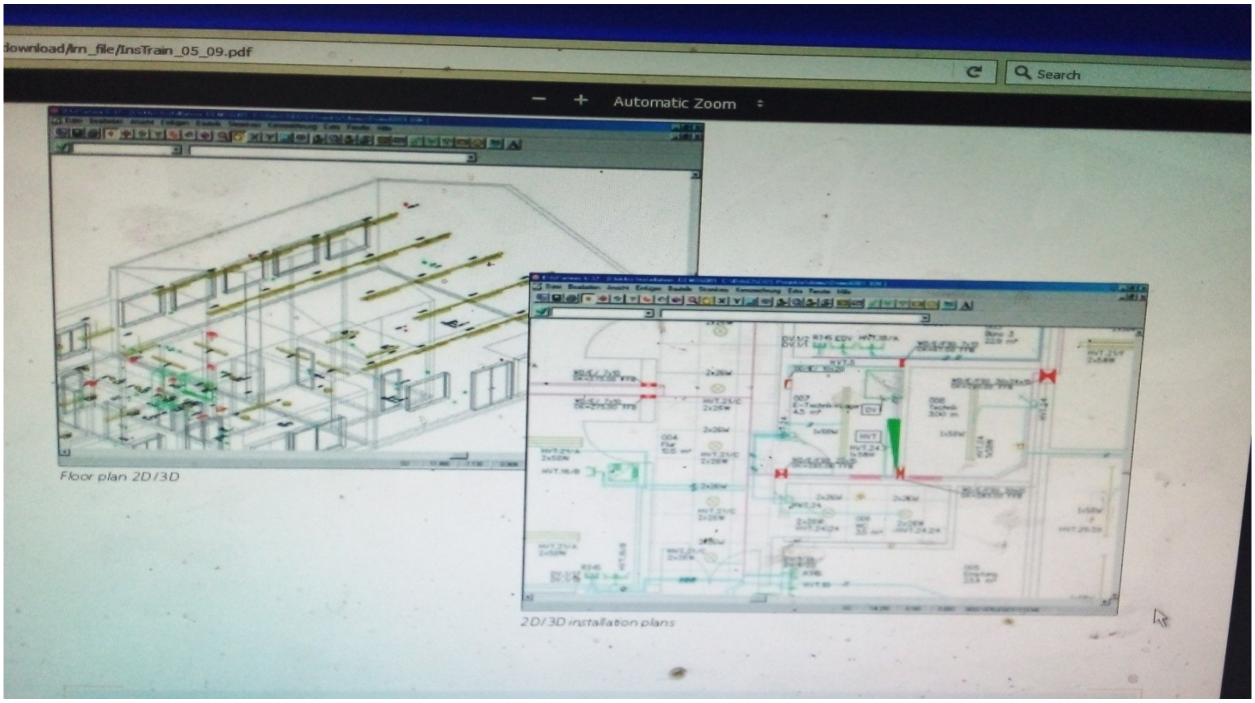
Panneau de formation sur les circuits électriques automobiles Matériel de

Entraîneur électrique pour voiture entière Équipement didactique

Automobile Final Drive System Trainer Équipement d'enseignement

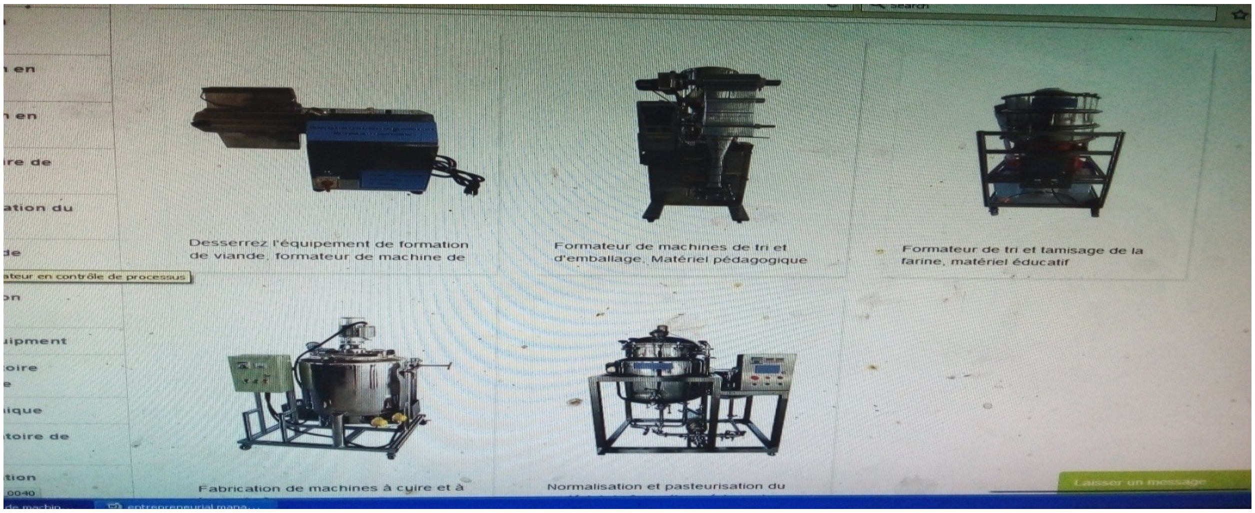
Système de formation sur le refroidissement du moteur

Système de formation automobile complet Équipement de formation



Floor plan 2D/3D

2D/3D installation plans



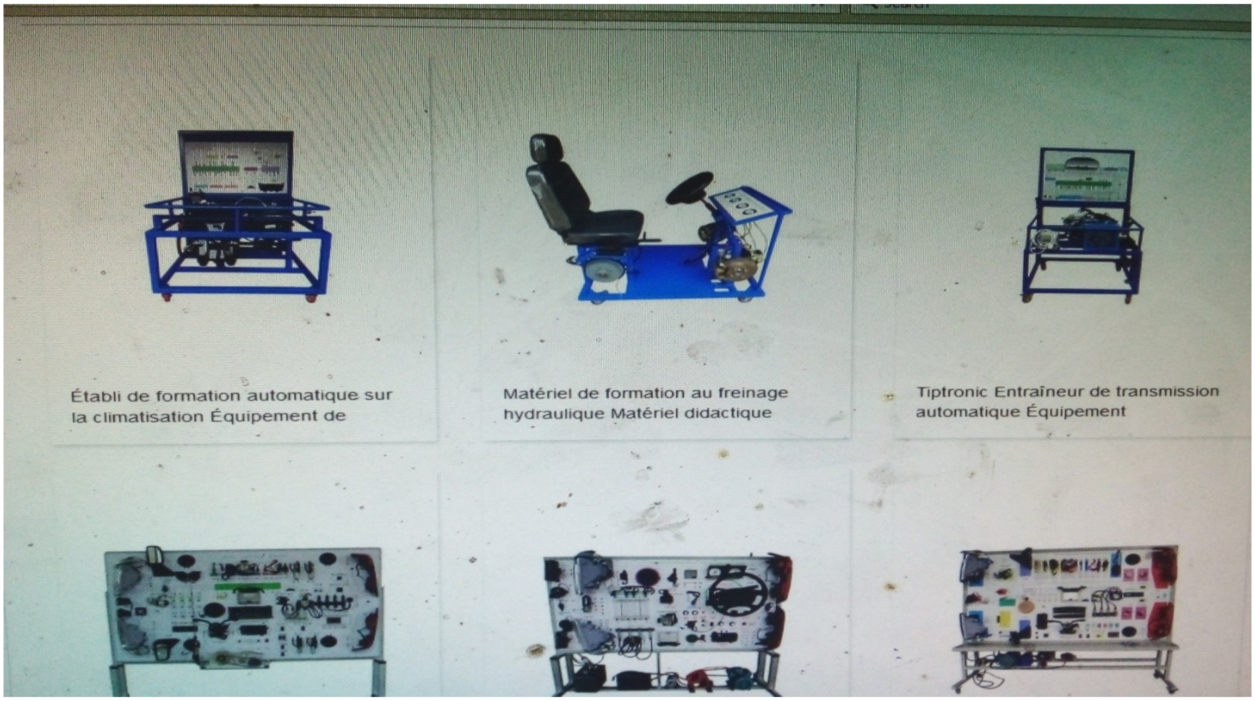
Desserrez l'équipement de formation de viande, formateur de machine de

Formateur de machines de tri et d'emballage, Matériel pédagogique

Formateur de tri et tamisage de la farine, matériel éducatif

Fabrication de machines à cuire et à

Normalisation et pasteurisation du



Établi de formation automatique sur la climatisation Équipement de

Matériel de formation au freinage hydraulique Matériel didactique

Tiptronic Entraîneur de transmission automatique Équipement

Matériel didactique Théorie électrotechnique, entraîneur de

PIC Trainer, équipement didactique, kit d'entraînement pour

Boîte d'expérimentation de moteur pas à pas Équipement didactique

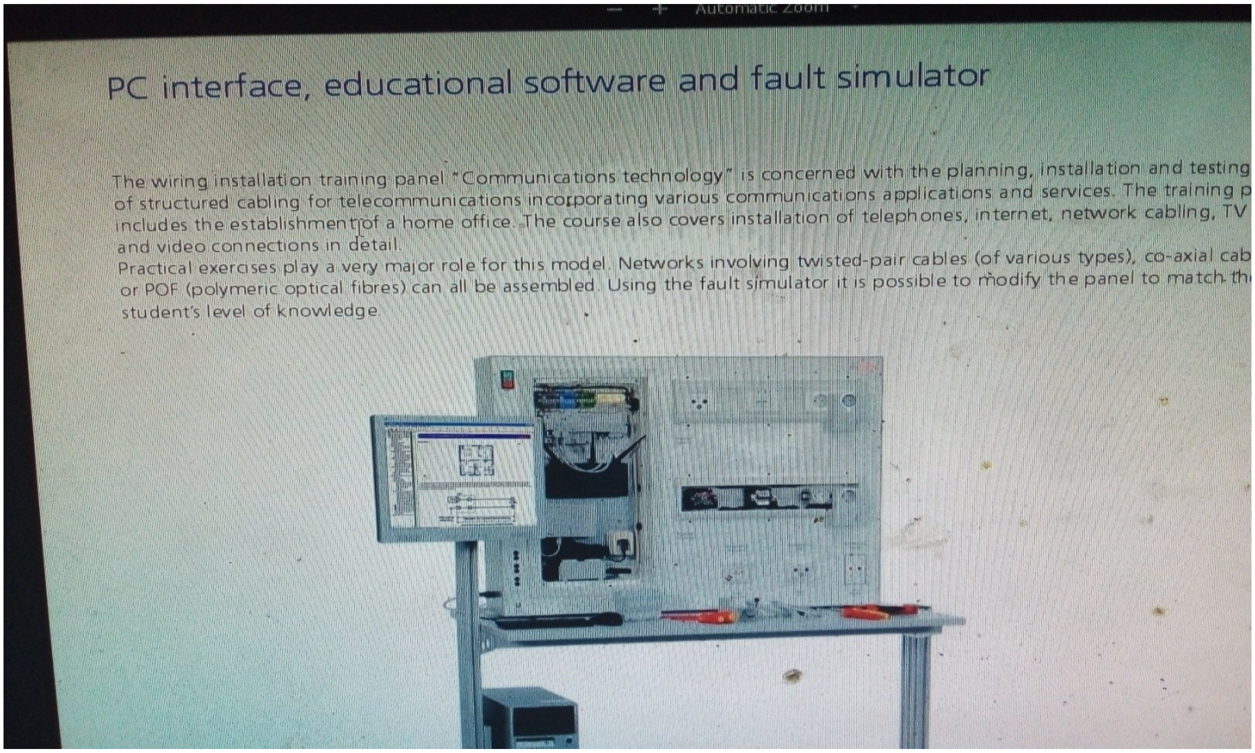
Machine à souder à refoulement à montage en surface, équipement de

Machine de gravure de jet de carte PCB, équipement d'expérience de

Machine de gravure de jet complètement automatique,

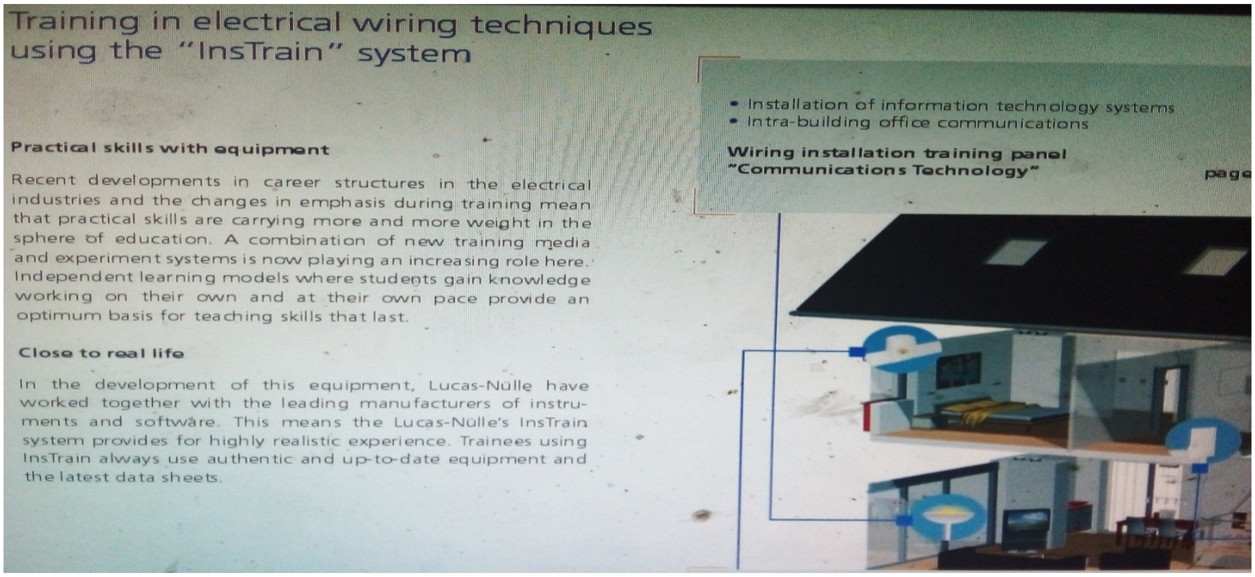
Multimedia Installation Lab

For electrical
wiring installation



PC interface, educational software and fault simulator

The wiring installation training panel "Communications technology" is concerned with the planning, installation and testing
of structured cabling for telecommunications incorporating various communications applications and services. The training p
includes the establishment of a home office. The course also covers installation of telephones, internet, network cabling, TV
and video connections in detail.
Practical exercises play a very major role for this model. Networks involving twisted-pair cables (of various types), co-axial cab
or POF (polymeric optical fibres) can all be assembled. Using the fault simulator it is possible to modify the panel to match th
student's level of knowledge.



Training in electrical wiring techniques using the "InsTrain" system

Practical skills with equipment

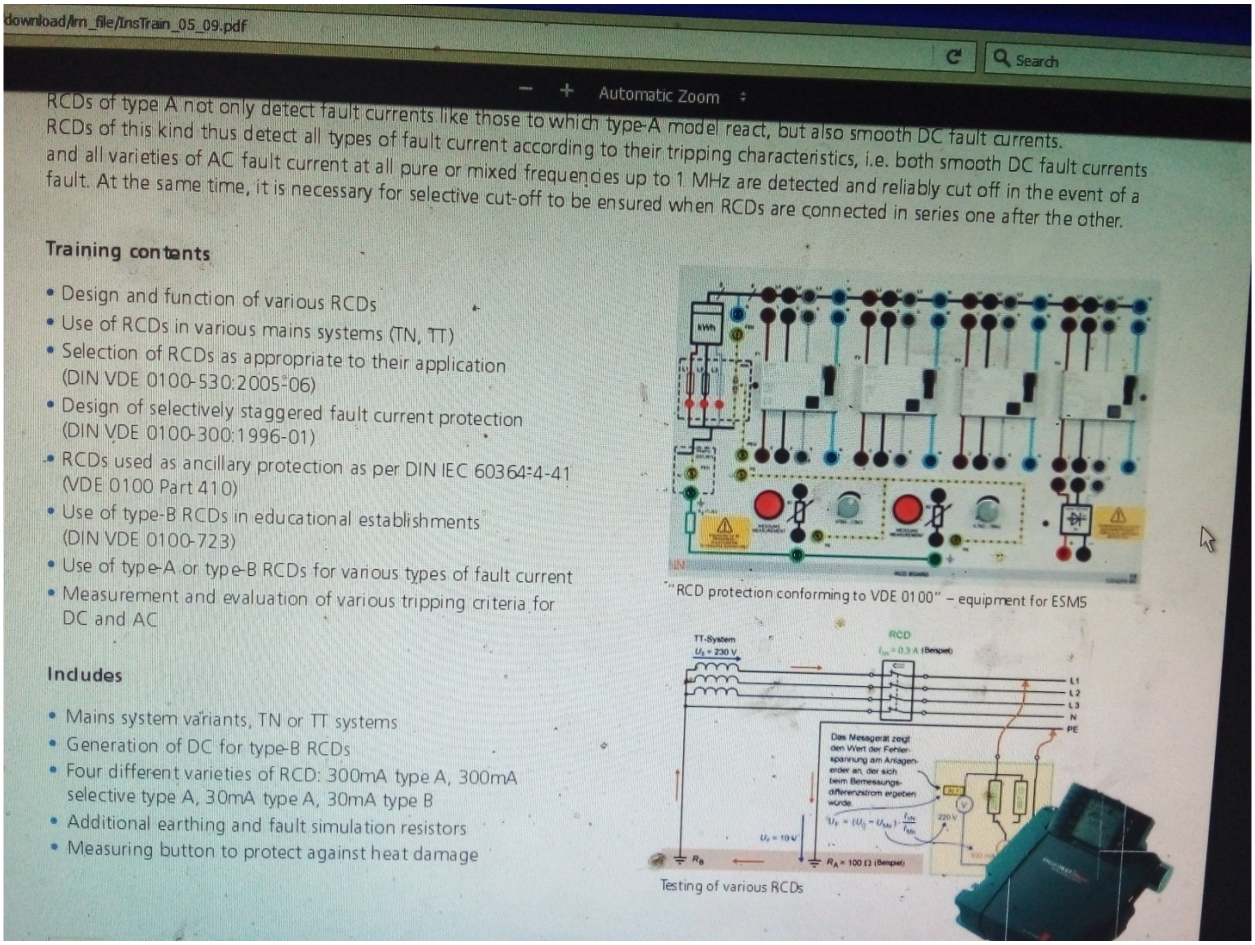
Recent developments in career structures in the electrical industries and the changes in emphasis during training mean that practical skills are carrying more and more weight in the sphere of education. A combination of new training media and experiment systems is now playing an increasing role here. Independent learning models where students gain knowledge working on their own and at their own pace provide an optimum basis for teaching skills that last.

Close to real life

In the development of this equipment, Lucas-Nülle have worked together with the leading manufacturers of instruments and software. This means the Lucas-Nülle's InsTrain system provides for highly realistic experience. Trainees using InsTrain always use authentic and up-to-date equipment and the latest data sheets.

- Installation of information technology systems
- Intra-building office communications

Wiring installation training panel "Communications Technology"



RCDs of type A not only detect fault currents like those to which type-A model react, but also smooth DC fault currents. RCDs of this kind thus detect all types of fault current according to their tripping characteristics, i.e. both smooth DC fault currents and all varieties of AC fault current at all pure or mixed frequencies up to 1 MHz are detected and reliably cut off in the event of a fault. At the same time, it is necessary for selective cut-off to be ensured when RCDs are connected in series one after the other.

Training contents

- Design and function of various RCDs
- Use of RCDs in various mains systems (TN, TT)
- Selection of RCDs as appropriate to their application (DIN VDE 0100-530:2005-06)
- Design of selectively staggered fault current protection (DIN VDE 0100-300:1996-01)
- RCDs used as ancillary protection as per DIN IEC 60364-4-41 (VDE 0100 Part 410)
- Use of type-B RCDs in educational establishments (DIN VDE 0100-723)
- Use of type-A or type-B RCDs for various types of fault current
- Measurement and evaluation of various tripping criteria for DC and AC

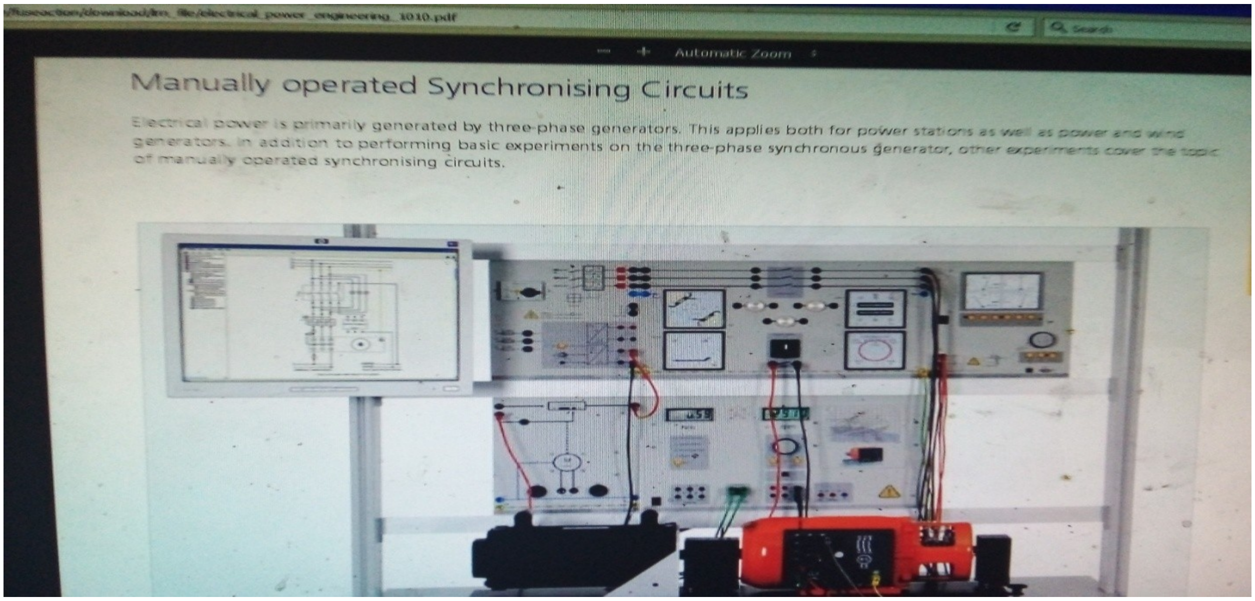
Includes

- Mains system variants, TN or TT systems
- Generation of DC for type-B RCDs
- Four different varieties of RCD: 300mA type A, 300mA selective type A, 30mA type A, 30mA type B
- Additional earthing and fault simulation resistors
- Measuring button to protect against heat damage

"RCD protection conforming to VDE 0100" – equipment for ESM5

TT-System
U₀ = 230 V
RCD
I∆N = 0.3 A (Beispiel)
L1
L2
L3
N
PE
Das Messgerät zeigt den Wert der Fehlerspannung am Anlagenerder an, der sich beim Bemessungsdifferenzstrom ergeben würde
220 V
U = 10 V
R_B
R_A = 100 Ω (Beispiel)

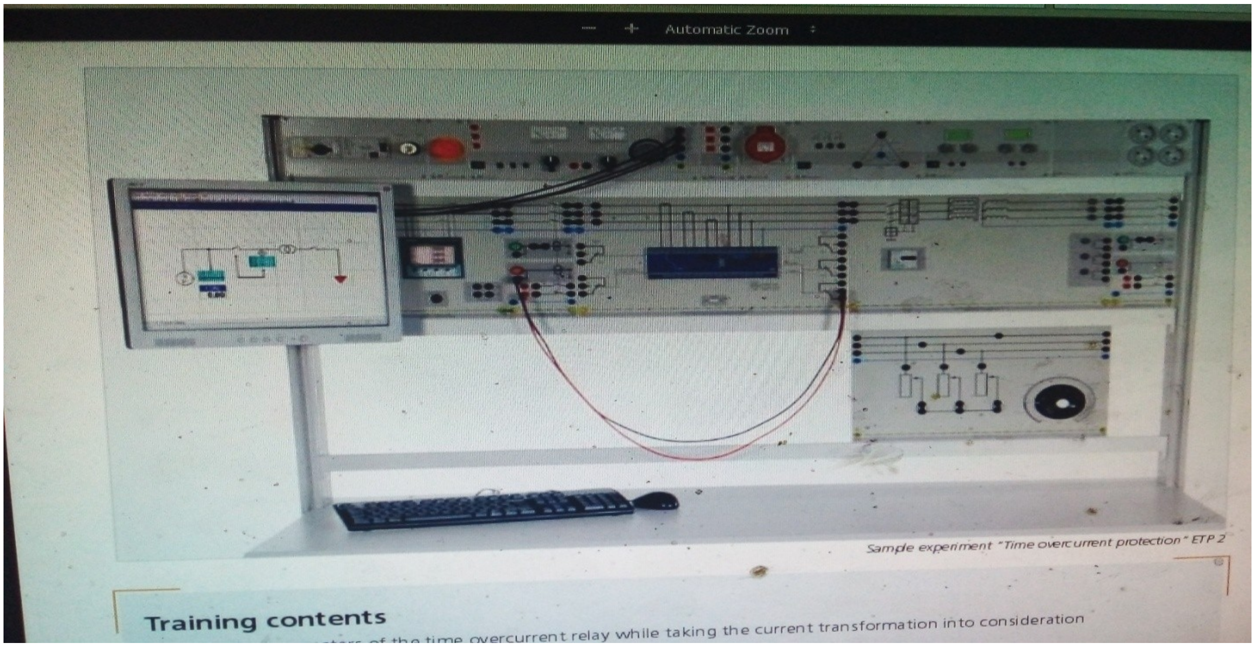
Testing of various RCDs



/fuseaction/download/lrn_file/electrical_power_engineering_1010.pdf
Search
Automatic Zoom

Manually operated Synchronising Circuits

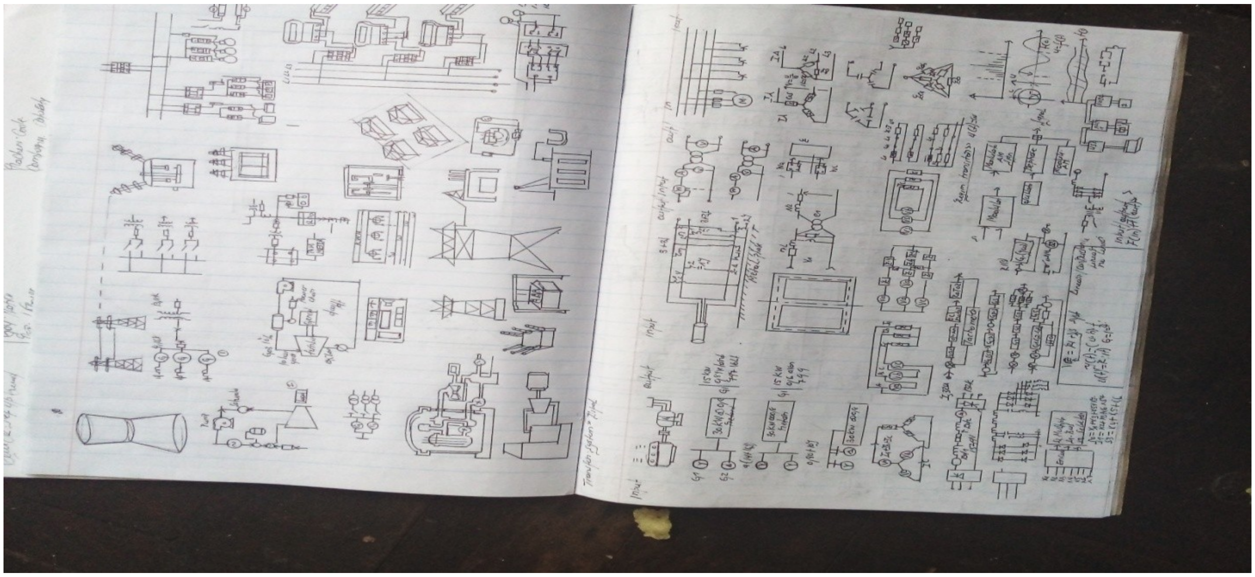
Electrical power is primarily generated by three-phase generators. This applies both for power stations as well as power and wind generators. In addition to performing basic experiments on the three-phase synchronous generator, other experiments cover the topic of manually operated synchronising circuits.

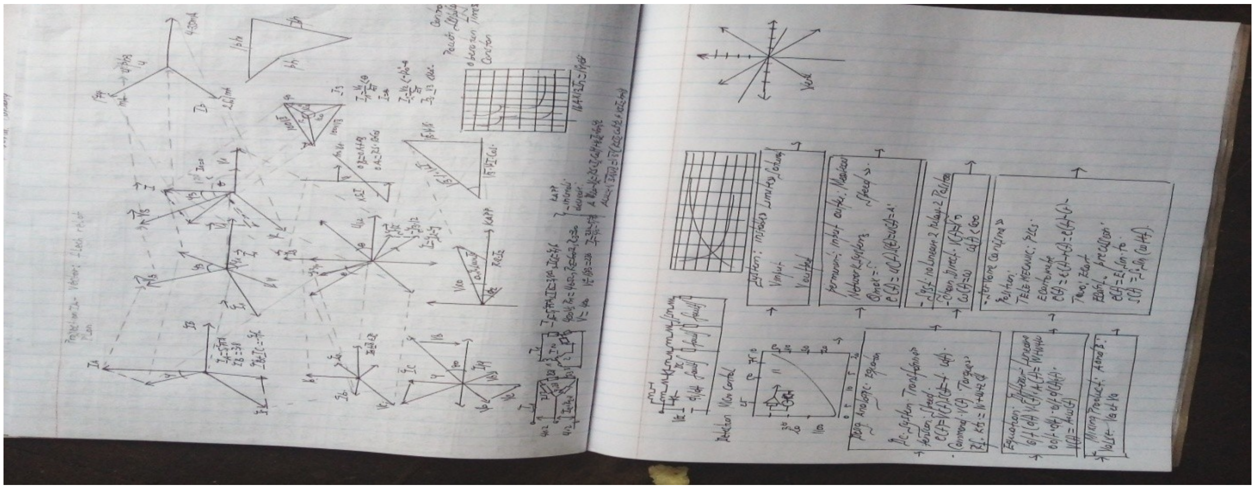


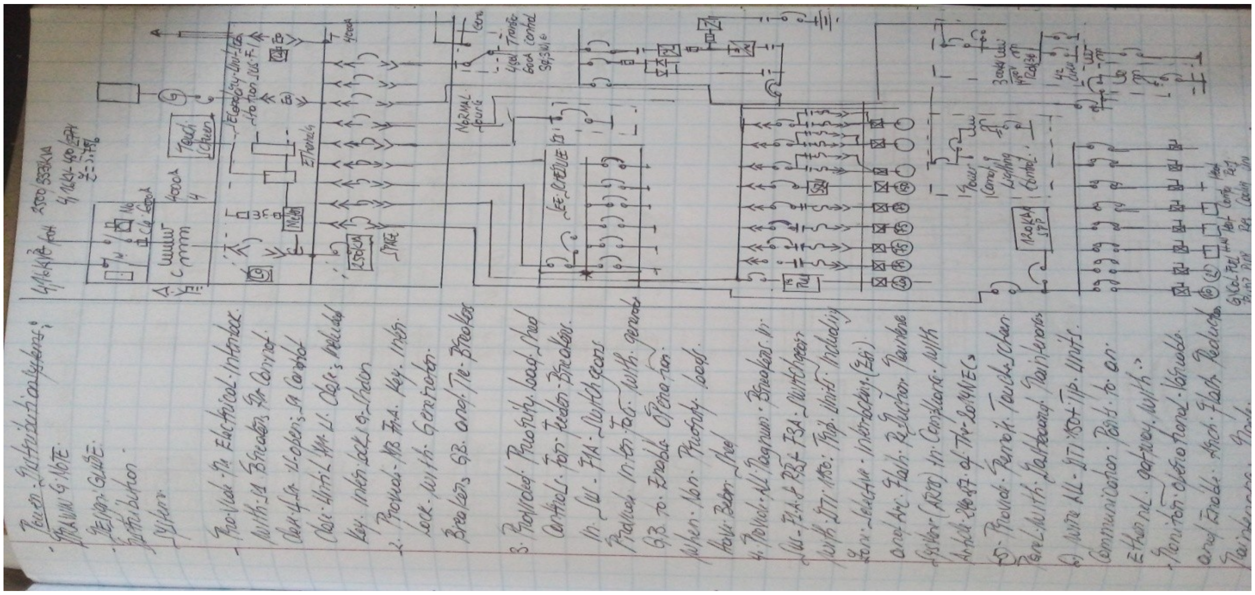
Sample experiment "Time overcurrent protection" ETP 2

Training contents

of the time overcurrent relay while taking the current transformation into consideration







Power-Distributionalsystems;
- DRAWING NOTE:
- DESIGN GUIDE:
- Distribution
System.

- Provide The Electrical-Interlock. With SA Breakers For Cannot close if SA U-open; SA Cannot close Until MA U. Close; Included Key. Interlocks as Shown

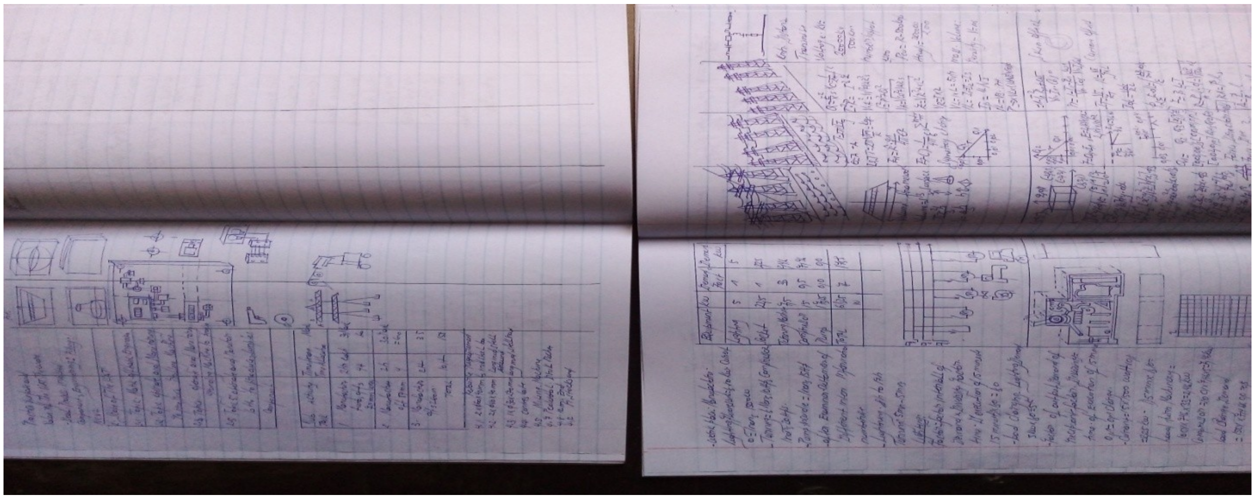
2. Provide MB FA. Key. Interlock-with Generator-Breakers, GB. and Tie-Breakers

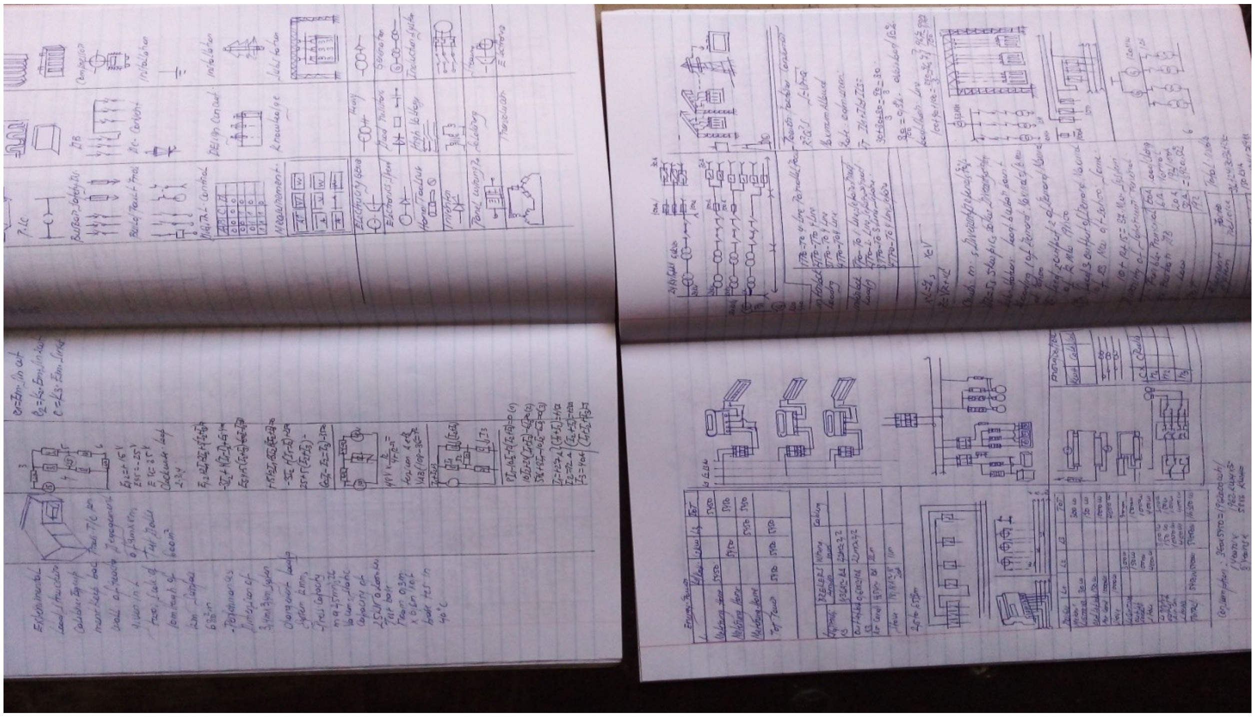
3. Provided Priority load shed Controls. For Feeder-Breakers. In SW - F1A - Switchgears Provide Interface. With generator GB to Enable Operation When Non-Priority loads Have Been Shed

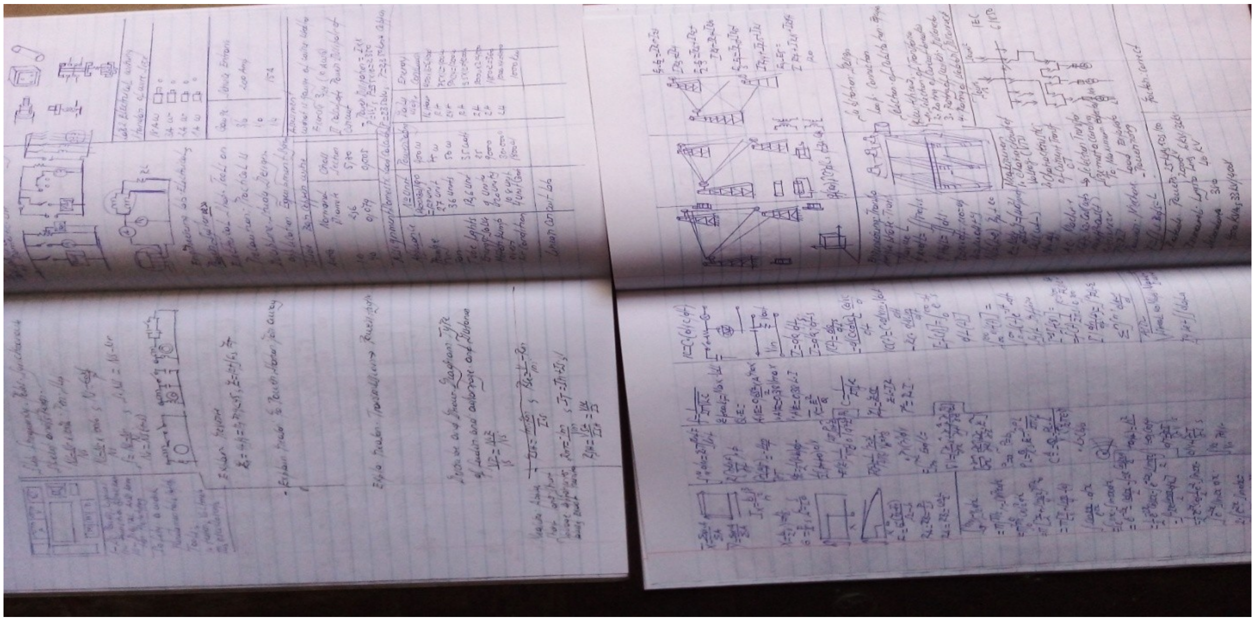
4. Provide All Magnum-Breakers. In SW-F1A & RB & F3A Switchgears With DT1 1150: Trip. Units Including Zone Selective-Interlocking. (ZSI) and Arc. Flash-Reduction Maintenance System (ARMS) In Compliance-With Article 240.87. of The 2014 NEC.

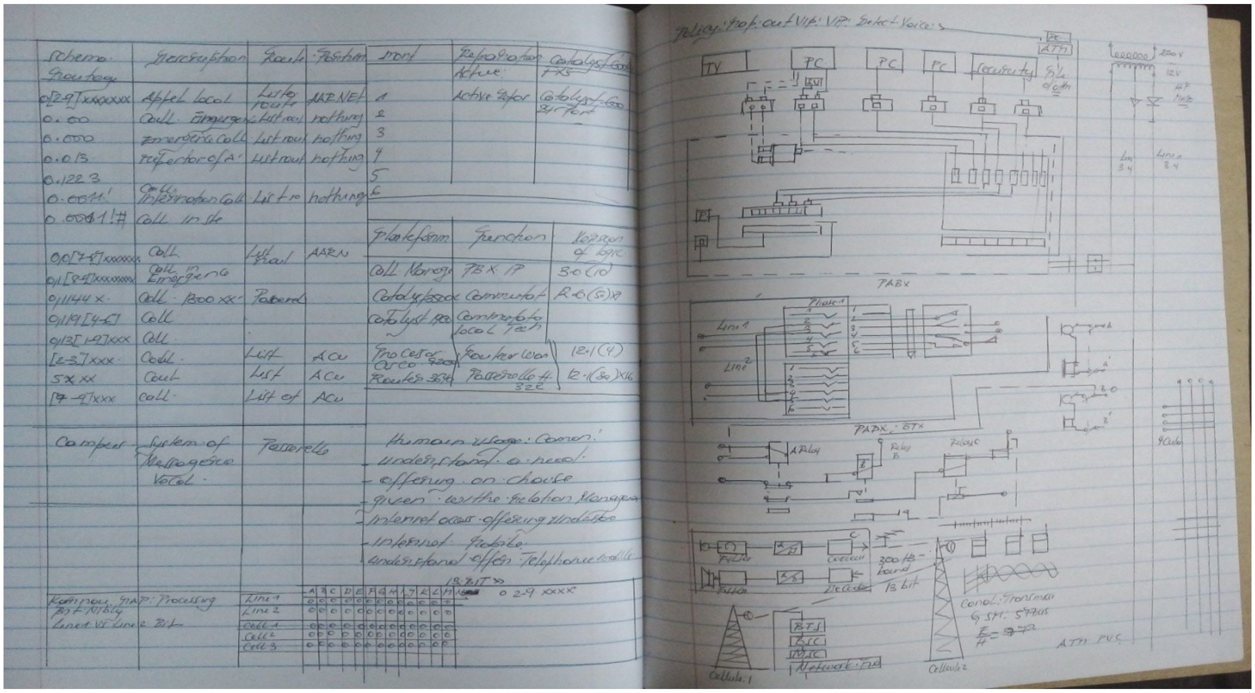
5. Provide-Remote. Touchscreen Panel. With Dashboard Maintenance

6. Wire All-DT1 150+ Trip. Units. Communication-Ports to an Ethernet gateway. With:
- Monitor operational-Variable and Enable-Arch-Flash Reduction Maintenance Mode:









Schema Routage	Description	Route	Position	mont	Repartiteur Active	Catalyst Cisco FXS
0[2-9]xxxxxxx	Appel local	Liste route	AARNET	1	Active Refor	Catalyst Cisco 24 Port
0.00	Call Emergen	List rout	nothing	2		
0.000	Emergence Call	List rout	nothing	3		
0.013	Repertor of A'	List rout	nothing	4		
0.122 3				5		
0.0011'	Call International Call	List ro	nothing	6		
0.0001!#	Call in the					
0,0[7-8]xxxxxx	Call	List Inal	AARN			
0,1[8-9]xxxxxxx	Call in Emergence					
0,1144 x	Call 1800 xx	Passerel				
0,119[4-6]	Call					
0,13[1-9]xxx	Call					
[2-3]xxx	Call	List	ACu			
5xxx	Call	List	ACu			
[7-9]xxx	Call	List of	ACu			
Campus	System of Messagerie Vocal	Passerelle				

Plateform	Fonction	Version of logic
Call Manage	PBX IP	3.0 (10)
Catalyst 3500	Commutator	12.0(5)X?
Catalyst 1900	Commutator local Tech	
Processor Cisco 3620	Router Wan	12.1(4)
Router 3640	Passerelle 4.322	12.1(30)X16

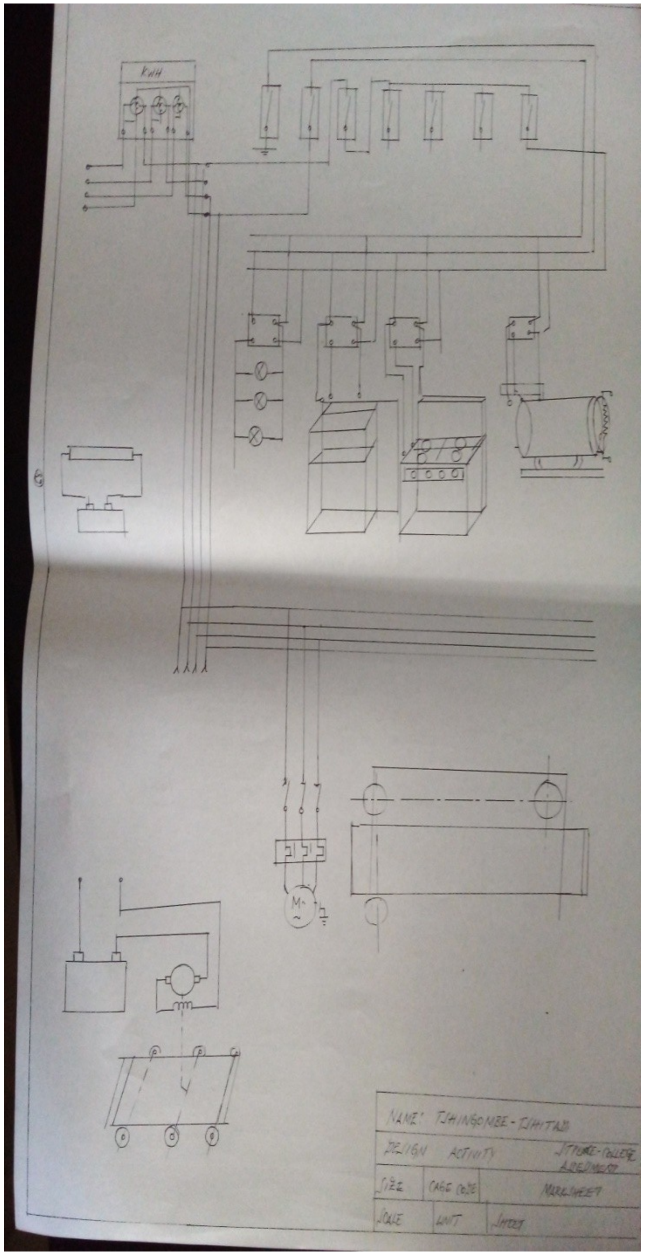
the main usage: Common
- understand a need
- offering on choose
- given with the relation Manager
- internet acces offering understoo
- internet mobile

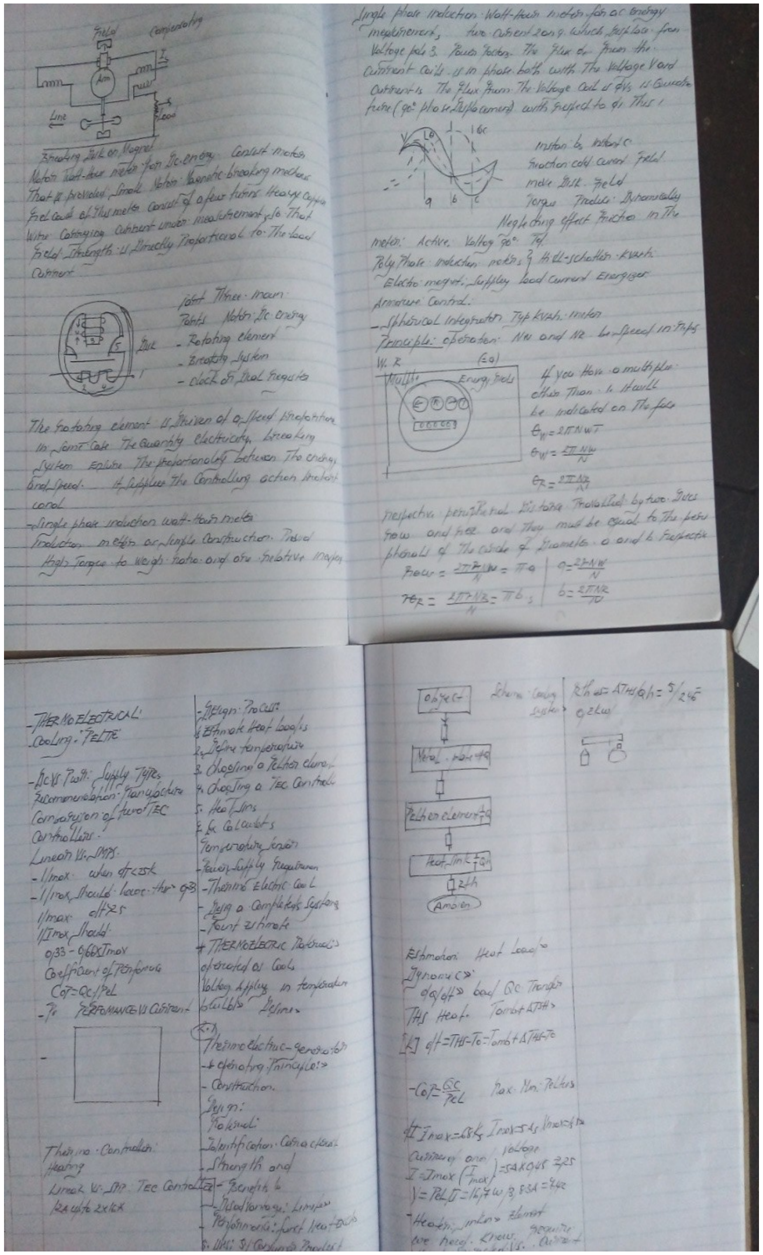
understand offer Telephone mobile

Kannou ?AP: Processing Bit Nibly
Line1 VS Line2 Bit

13 BIT >> 0 2-9 XXXX

	A	B	C	D	E	F	G	H	I	J	K	L	M
Line 1	o	o	o	o	o	o	o	o	o	o	o	o	o
Line 2	o	o	o	o	o	o	o	o	o	o	o	o	o
Cell 1	o	o	o	o	o	o	o	o	o	o	o	o	o
Cell 2	o	o	o	o	o	o	o	o	o	o	o	o	o
Cell 3	o	o	o	o	o	o	o	o	o	o	o	o	o




Field
Compensating
Am
I_L
Line
Load
1
2
3
4
5
Disk
V
$L\theta$
I_C
a
b
c
W. R
(Ea)
Multi
Energy Dials
Object
Metal [illegible]
Peltier element
Heat sink
Rth
Ambien

Breaking Disk on Magnet
Motor Watt-hour meter for D.c. energy. Consist motor Motor Watt-hour meter for Dc energy. Magnetic breaking mechanism That is provided; Small Motor. Field coils of This meter consist of a few turns Heavy Copper Wire Carrying Current under measurement, So That Field Strength is Directly Proportional to The load Current

Part Three main Parts Motor Dc energy
- Rotating element
- Breaking System
- Clock of Dial Register

The Rotating element is Driven at a Speed Proportional in Same Case The Quantity Electricity. Breaking System Ensure The Proportionality between The energy and Speed. It Supplies The Controlling action [illegible] canal

- Single phase induction watt-Hour meter
Induction meters are Simple Construction. Provid High Torque to Weigh Ratio and are Relative [illegible]

Single phase Induction Watt-Hour meter for a.c energy measurement, two current [illegible] which [illegible] from Voltage [illegible] 3. Power Factor. The Flux ϕ_1 from the Current Coils is in phase both with The Voltage V and Current is The Flux from The Voltage Coil is ϕV_s is Quadrature (90° phase Displacement) with respect to ϕ_1 This:

Motor [illegible] [illegible] Reaction coil Current Field make Disk. Field Torque Produce Dynamically Neglecting effect Friction in The meter. Active Voltage 90° [illegible]
Poly Phase induction meters; [illegible] [illegible] kvarh
- Electro magnet; Supply load Current Energizer
Armature Control.
- Spherical Integrator Type kVAh meter
Principle: operation: N_W and N_R be speed in [illegible]

If you Have a multiplier other Than 1 it will be indicated on The face

$\theta_W = 2\pi N_W T$

$\theta_W = \frac{2\pi N_W}{N}$

$\theta_R = \frac{2\pi N_R}{N}$

respective peripheral distance Travelled by two Discs [illegible] and [illegible] and They must be equal to The [illegible] [illegible] of The circle of Diameter a and b Respective

$r\theta_W = \frac{2\pi r N_W}{N} = \pi a$ | $a = \frac{2rN_W}{N}$

$r\theta_R = \frac{2\pi r N_R}{N} = \pi b$ | $b = \frac{2\pi N_R}{N}$

- THERMOELECTRICAL
- Cooling: "PELTIE"

- DC Vs PWM: Supply Types
Recommendation: Manufacturer
Comparison of Two TEC Controllers.
Linear Vs. SMPS.
- I/Imax when dT<25K
- I/Imax Should lower than 0.3
I/Imax dT>25
I/Imax Should
0.33 - 0.66×Imax
Coefficient of Performance
COP = Qc/Pel
- [illegible] PERFORMANCE VS CURRENT

Thermo Controller: Heating
Linear Vs. PWM TEC Controller
12A upto 2x16X

- Design Process:
1. Estimate Heat loads
2. Define temperature
3. Choosing a Peltier element
4. Choosing a TEC Controller
5. Heat Sinks
6. [illegible] Calculators
Temperature Sensor
Power Supply Requirement
- Thermo Electric Cool
- Design a Complete System
- Rough estimate
+ THERMOELECTRIC Material's operated as Cools Voltage Applied in temperature [illegible] Defines

(2.1) Thermo Electric - Generator
- Operating Principle:
- Construction.
Design:
Material:
Identification Characteristic
Strength and
- Benefits &
- Disadvantage: Limited Performance: [illegible] Heat [illegible]
6. [illegible] Product

Scheme Cooling System

$R_{th} = \Delta T_{HS}/Q_h = 5/246 = 0.2kw$

Estimation Heat Load:
Dynamic:
dQ/dt » load Qc Transfer
THS Heat. Tamb + ΔTHS
[K] dT = THS - Tc = Tamb + ΔTHS - Tc

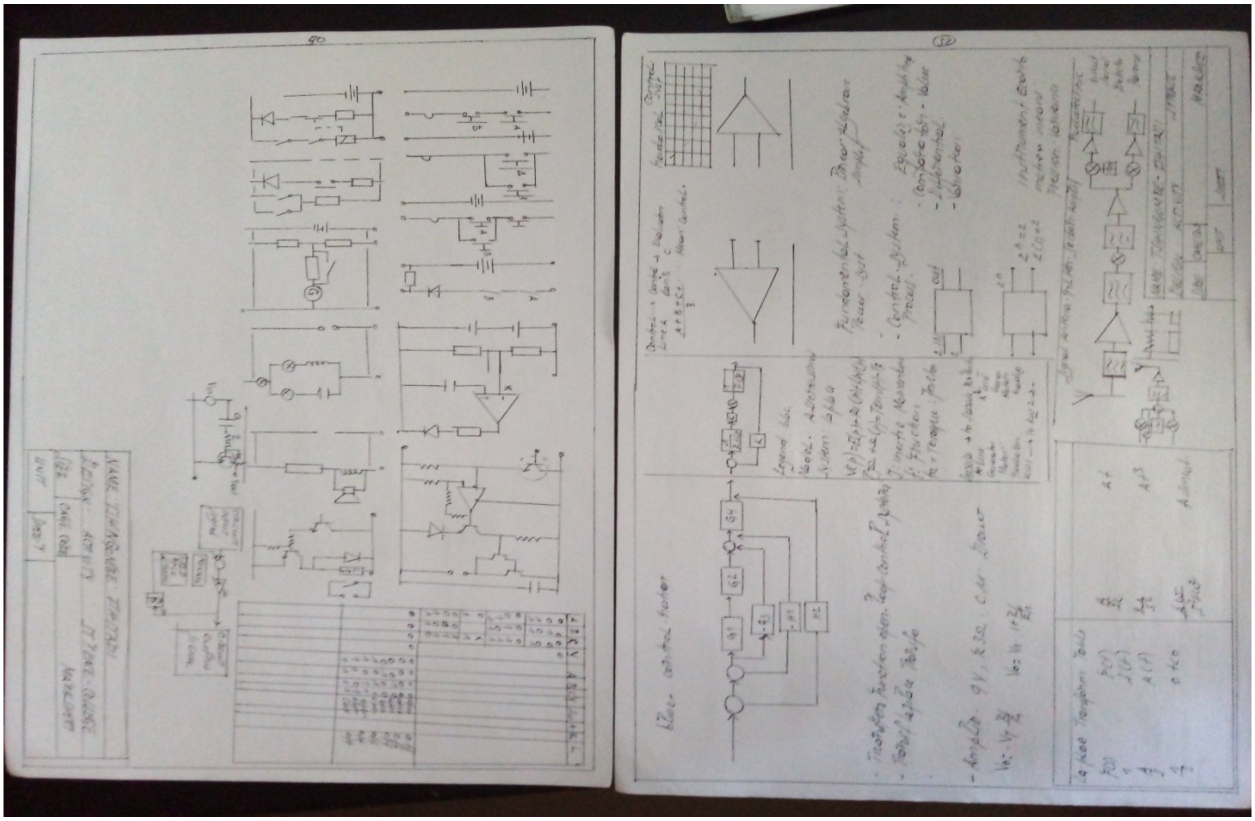
- COP = Qc/Pel   Max. Num. Peltiers

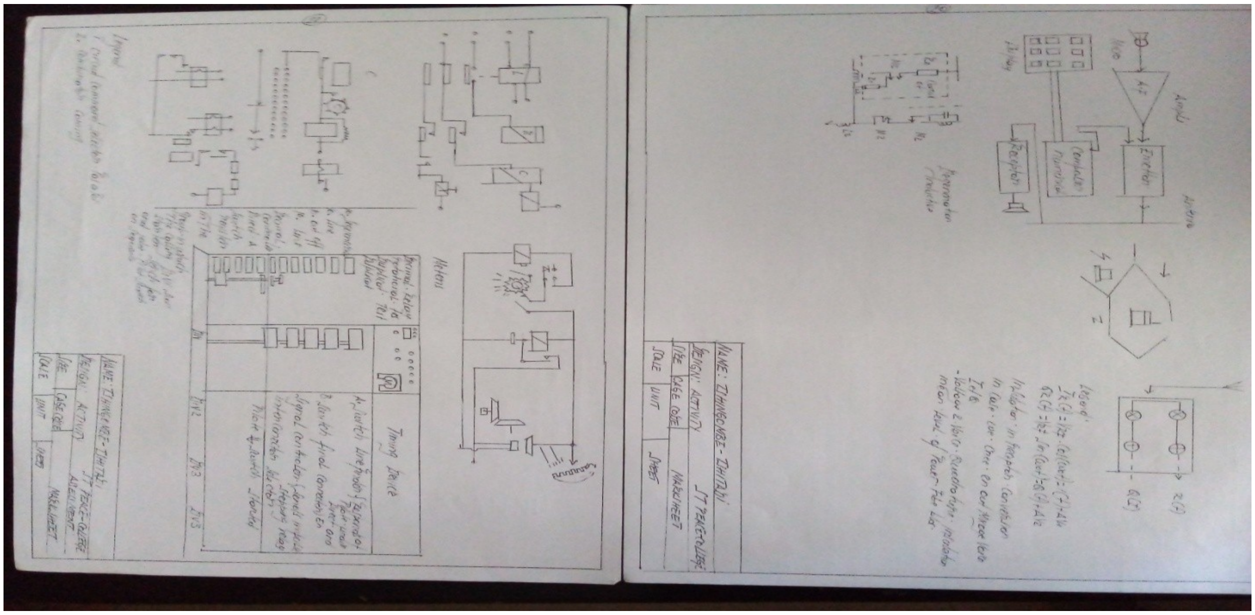
At Imax = 6.8A, Imax = 5A, Vmax = [illegible]
Current and Voltage

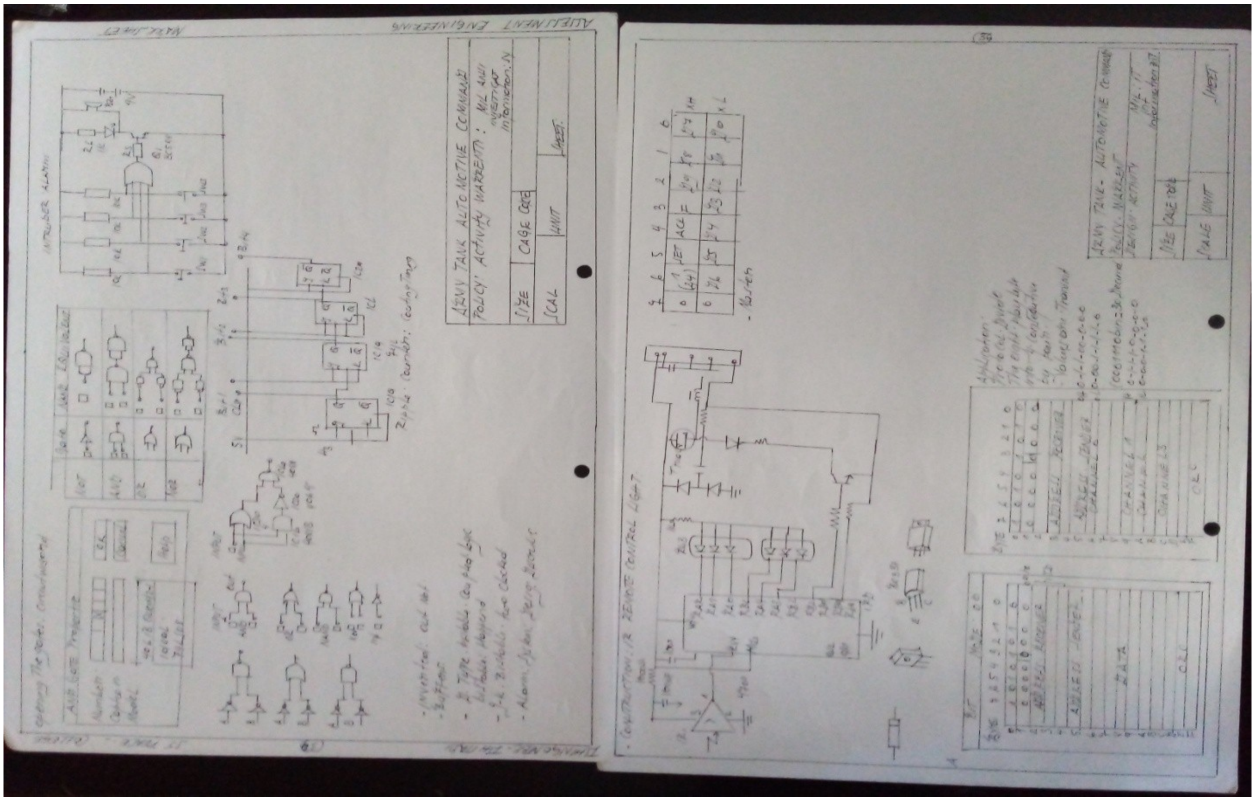
$I = I_{max}\left(\frac{I}{I_{max}}\right) = 5A \times 0.45 = 2.25$

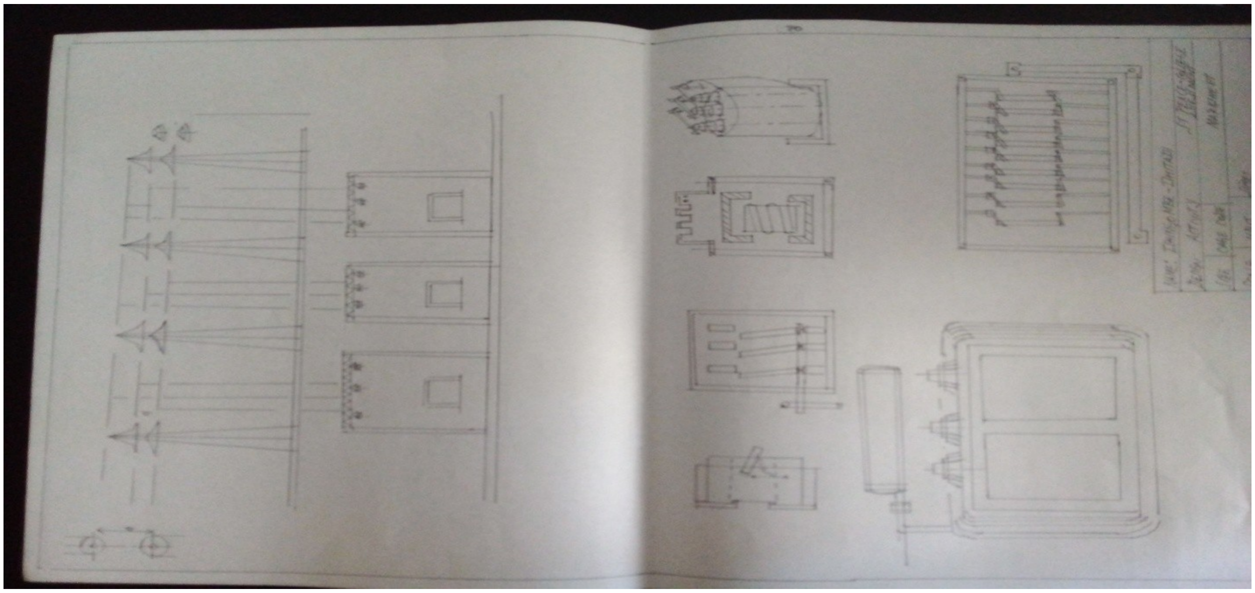
$V = P_{el}/I = 16.7W / 3.83A = 4.42$

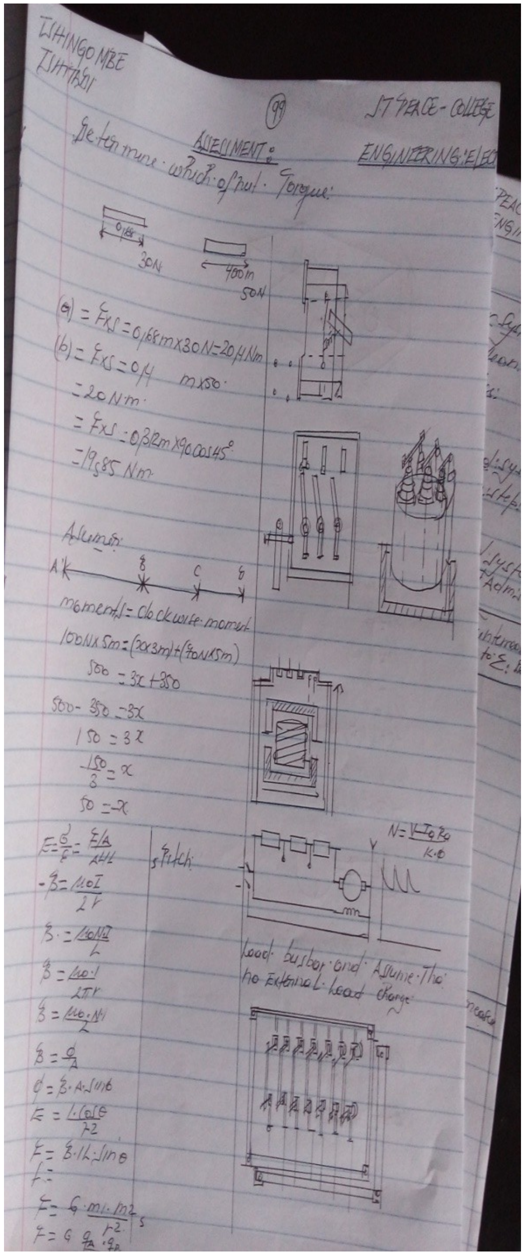
- Heatsink: [illegible] [illegible] we need. Know [illegible] Required [illegible] Vs. Current






ALIGNMENT ENGINEERING
INTRUDER ALARM
ARMY TANK AUTOMOTIVE COMMAND
POLICY ACTIVITY WARRANTS : MIL ANSI INVESTIGATION INFORMATION
SIZE
CAGE CODE
SCAL
UNIT
SHEET
CONSTRUCTION: IR REMOTE CONTROL LIGHT
ARMY TANK - AUTOMOTIVE COMMAND





IJHINGOMBE
IJHITABI

(99)

JT PEACE - COLLEGE

ASSESSMENT:

ENGINEERING ELEC

Determine which of nut Torque:

0,68
30N
400m
50N

(a) = F×S = 0,68m×30N = 20,4Nm
(b) = F×S = 0,4 m×50
= 20 N·m
= F×S = 0,32m×90cos45°
= 19,85 Nm

Assume:

A
B
C
D

moments = clockwise moment
100N×5m = (x×3m)+(70N×5m)
500 = 3x+350
500 - 350 = 3x
150 = 3x
$\frac{150}{3} = x$
50 = x

$E = \frac{\sigma}{\varepsilon} = \frac{F/A}{\Delta L/L}$

Pitch

$B = \frac{\mu_0 I}{2r}$

$B = \frac{\mu_0 N I}{L}$

$B = \frac{\mu_0 I}{2\pi r}$

$B = \frac{\mu_0 N I}{L}$

$B = \frac{\phi}{A}$

$\phi = B \cdot A \cdot \sin\theta$

$E = \frac{I \cdot \cos\theta}{r^2}$

$F = B \cdot I L \cdot \sin\theta$

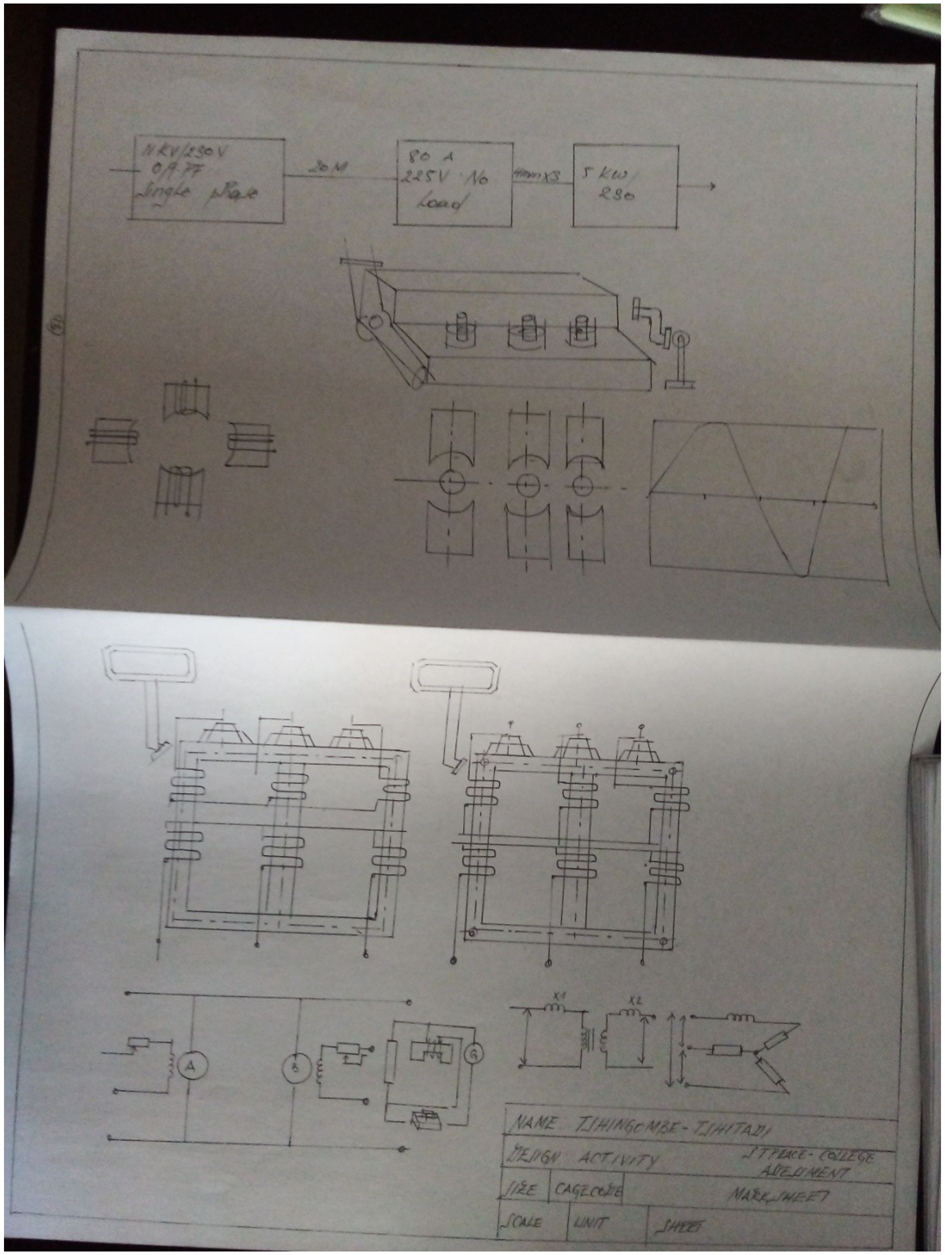
$F =$

$F = G \frac{m_1 \cdot m_2}{r^2}$

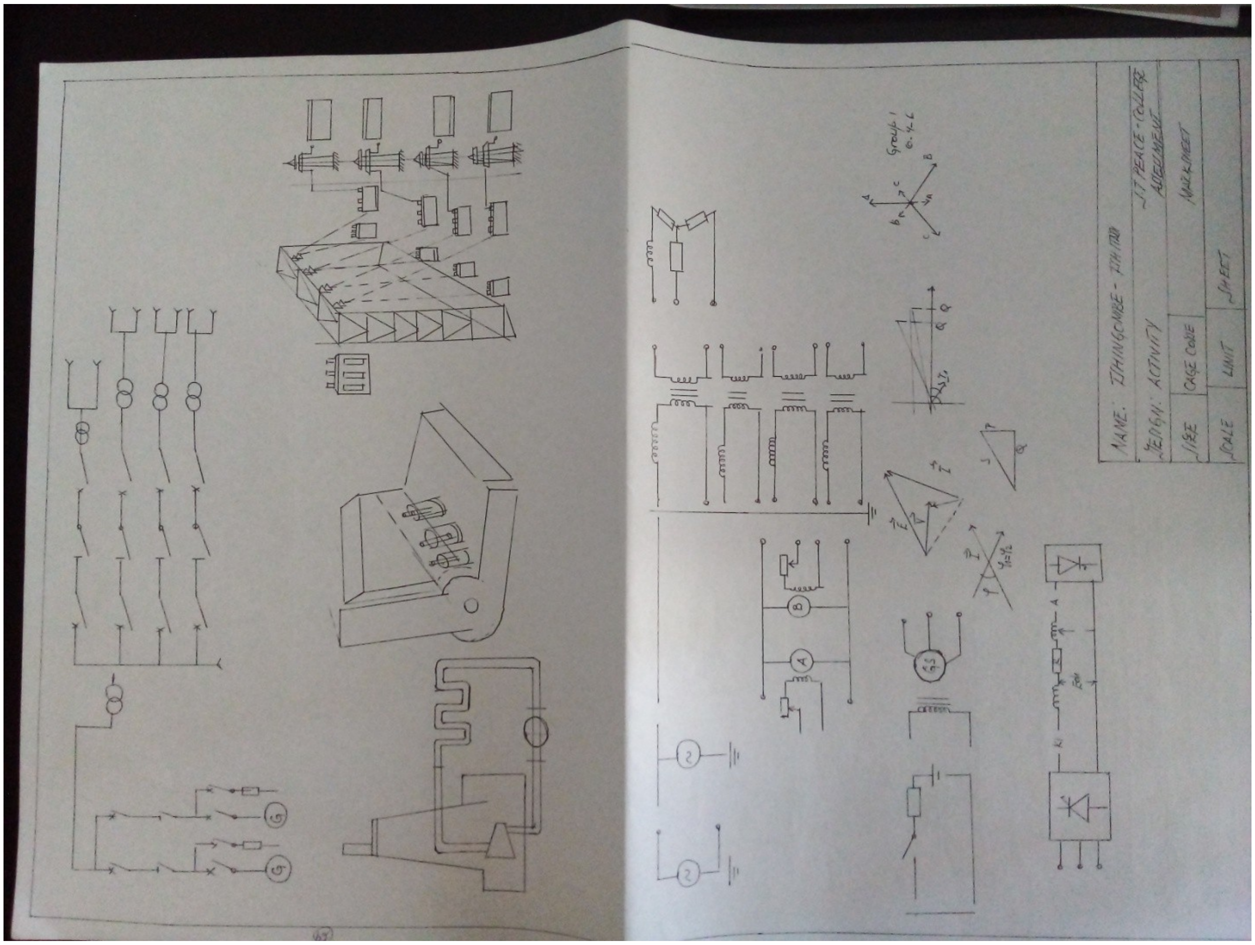
$F = G \, q_A \cdot q_B$

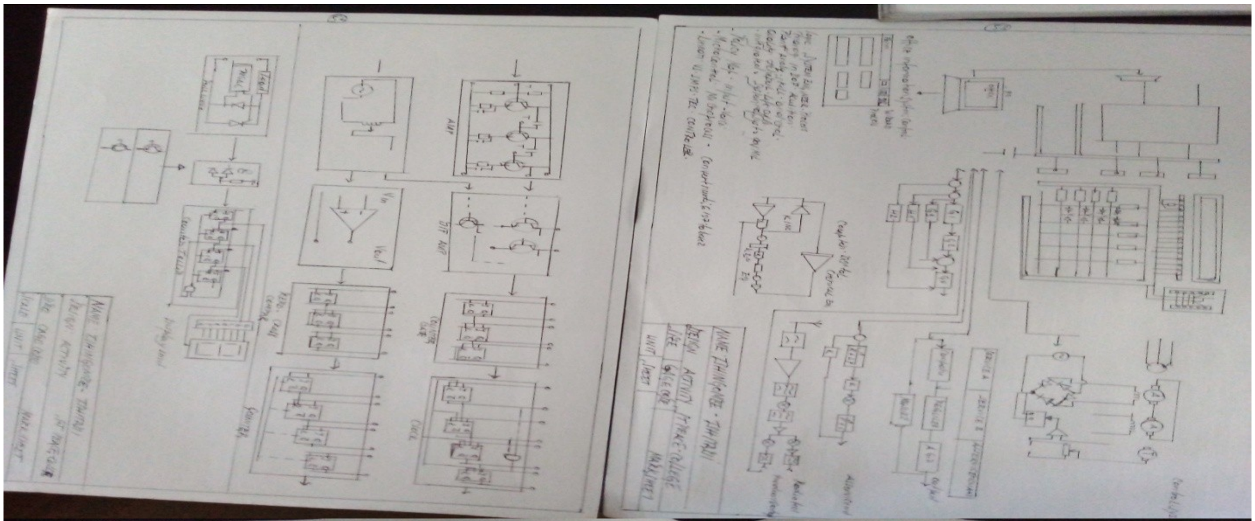
$N = \frac{V - I_a R_a}{K \cdot \phi}$

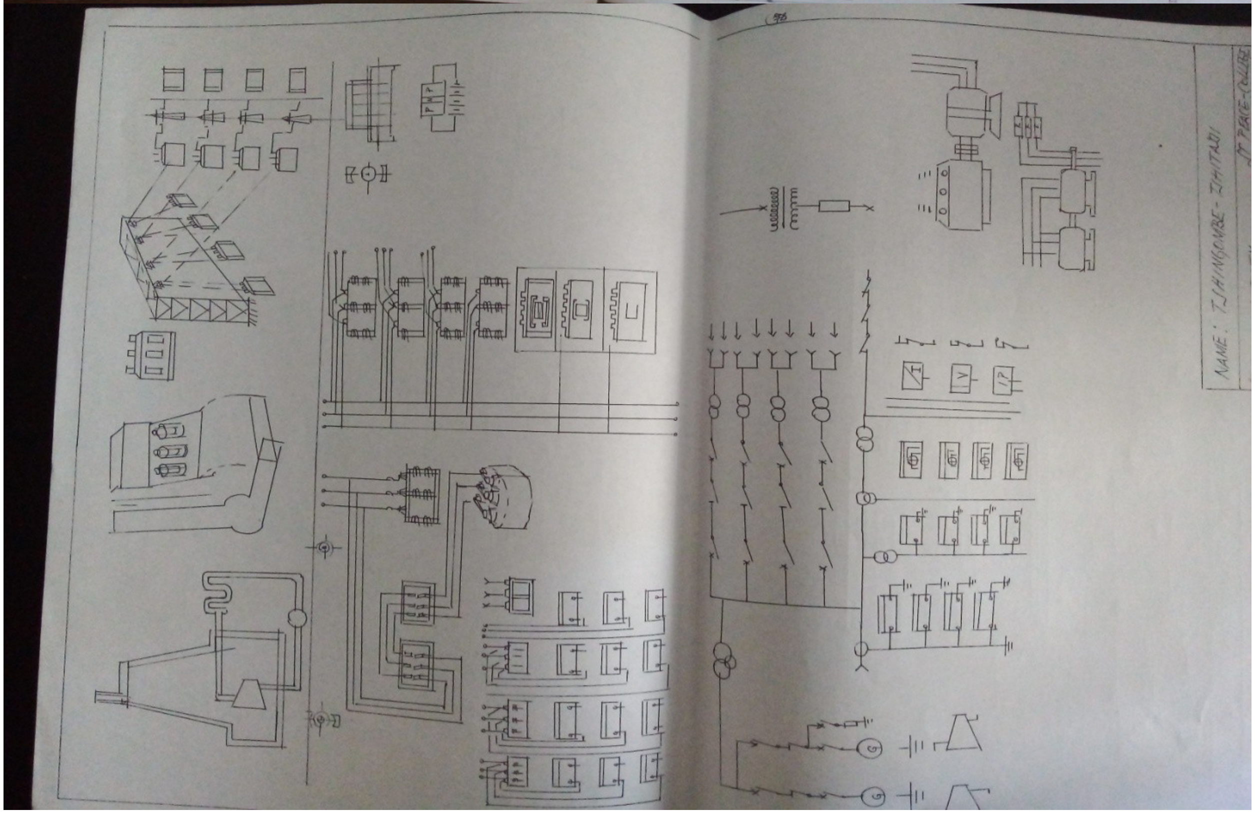
Load busbar and Assume the no External load change



NAME TJHINGOMBE - TJHITADI
DESIGN ACTIVITY
JT PEACE - COLLEGE ASSESSMENT
SIZE
CAGE CODE
MARK SHEET
SCALE
UNIT
SHEET


NAME: IJHINGOMBE - IJH...
DESGN: ACTIVITY
J.T PEACE - COLLEGE
ASSESSMENT
MARKSHEET
SIZE
CAGE CODE
SCALE
UNIT
SHEET
Group 1





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Activité 1 : Le tangram

Fiches Techniques à confectionner

Chaque matériel confectionné est accompagné d'une fiche technique, qui est un tableau comportant : les matériaux, les outils, la procédure de fabrication, l'utilisation, le prolongement et le transfert.

Matériaux
Outils
Procédure
Utilisation
Prolongement

Activité 1 : Le tangram

Matériaux
Outils
Procédure
Utilisation
Prolongement

Carton :
calendrier,
Papier canson,
cartoline
etc....

Crayon,
règle,
Gomme,
ciseaux.

1. Tracer un carré ABCD de 10 cm de côté
2. Placer E milieu de [AB], placer F milieu de [AD], tracer [EF].
3. Tracer les diagonales, placer G milieu de[EF]effacer [AG]Les diagonales se coupent en H.
4. placer I, le milieu de [DH], tracer [FI]
5. Placer J, le milieu de [BH].tracer [GJ]
6. Découper :

- [FE]
- [DB]
- [HC]
- [FI]
- [GH] et [GJ].

1. Former des ensembles (carré triangles, losange...)
2. Réaliser les figures telles que trapèze rectangle, trapèze isocèle, parallélogramme.
3. Introduire la notion d'unité de mesure des aires.
4. comparer des aires des figures du tangram.
5. Chercher les axes de symétrie dans les pièces du tangram.

Reproduire des figurines pour réaliser des tableaux de décoration.

Activité 2 : L'équerre par pliage

Matériaux
Outils
Procédure
Utilisation
Prolongement

Feuille blanche

néant

Double pliage :

- Plier la feuille sans faire correspondre les bouts.
- Plier de nouveau en faisant correspondre les bords du premier pliage

-poser sur un carton et découper.

Matériel de substitution de l'équerre.

- Vérifier un angle droit.
- Tracer un carré ou un rectangle.

11

Activité 9 : Réalisation expérimentale d'une boussole

Matériels nécessaires :
1 récipient non métallique
1 tige ou une lame mince magnétisable
1 flotteur (liège ; polystyrène expansé…)
1 aimant
N
S

L’aiment est un matériau qui a la propriété d’attirer certains métaux. Il présente deux pôles (nord ; sud).

La terre se présente comme un gros aimant ayant également son pôle nord au nord et son pôle sud au sud.

Quand on dépose dessus une aiguille aimantée, elle voudrait se présenter parallèlement à l’axe nord - sud et dans la même disposition, mais des problèmes d’adhérence au sol l’en empêcherait.

N
S
Aiguille aimantée
Terre

Fiche technique :

En s’inspirant de la fiche technique, réaliser un dispositif expérimental de simulation de la boussole.

N°
Phase
Matériaux
Outils
Procédure
Représentation
01
Remplissage du récipient
Remplir à moitié le récipient
02
Aimantation de l’aiguille
Aiment
Frotter un seul bout avec le pôle nord (si on frotte le bout avec le pôle sud, l’aiguille prendra le sens sud)
S
N
03
Expérimentation
Planter horizontalement l’aiguille dans le flotteur en veillant à l’équilibre. Placer le flotteur avec son aiguille sur la surface de l’eau et au milieu du r

Activité 6 : Réalisation d’une maquette de pyramide à base carrée

En se basant sur la fiche technique, réaliser une maquette de pyramide pareille à celle ci-dessous conformément au dessin coté.

Fiche technique :

N°
Phase
Matériaux
Outils
Procédure
01
Traçage du carré de coté donné.
Feuille de papier, papier canson, carton etc.…
Crayon, règle graduée, équerre
-Tracer un carré de coté donné
-Tracer les médianes en traits interrompus courts fins
02
Traçage des triangles latéraux (base =coté du carré et hauteur = hauteur de la pyramide
Crayon, règle graduée, équerre
Tracer 4 triangles de hauteur donnée et de base égale au coté du carré
03
Découpage de la développée de la pyramide
Ciseaux, lame, cutter
Prévoir de chaque coté de 2 triangles opposés, une petite bande de collage
Découper la figure ainsi obtenue.
04
Pliage des triangles (faces)
Rège plate mince
Plier les triangles sur le carré en vue d’obtenir en les réunissant des plans inclinés (leurs sommets concourent en un point qui est le sommet de la pyramide)
05
Collage
Colle blanche, ruban adhésif …
Pinceaux, bâtonnet, lame, etc.…

06
Séchage (si on utilise de
la colle)
Laisser sécher quelques minutes
17
4
7
18
Activité 7 : Réalisation d’une maquette de prisme
En se basant sur la fiche technique, réaliser une maquette de prisme pareille à celle ci-dessous
conformément au dessin coté :
Fiche technique
A
A
’
B
B’
C
C’
D
D’
N°
Phase
Matériaux
Outils
Procédure
01
Traçage du
développement
du prisme
Feuille de papier,
papier canson,
carton etc….
Crayon,
règle
graduée,
équerre
Reprendre le dessin de définition en
respectant les dimensions données.
02
Pliage
Rège plate
mince
Procéder au pliage :
-ABCD par rapport à AB
-A’B’C’D’ par rapport à A’B’
-AA’D’D par rapport à AA’
-BB’C’C par rapport à BB’
-CC’D’D par rapport à CC’
-A’B’C’D’ par rapport à A’B’
03
Découpe du
développement
du prisme
Ciseaux,
lame, cutter
Procéder à la découpe en prévoyant la bande
de collage.
04
Collage
Colle blanche,
ruban adhésif ...
Pinceaux,
lamelle,
bâtonnet
lame, etc….
05
Séchage (si on
utilise de la
colle)
Laisser sécher quelques minutes
19
5.00
4.00
7.00
4.00
5.00
6.00
A
A’
B
B’
C
C’
D
D’
C’
D’
D
D
D’
C
5.00
NB :le pavé droit se construit de la même façon. Dans ce cas, il n’ya pas de plan incliné. C’est un parallélépipède rectangle.
20
Activité 8 : Electricité : montage en série – montage en parallèle
Les lampes L
1
et L
2
s’allument
ou s’éteignent en même temps. Si
l’une est hors d’usage, l’autre ne
s’allume pas. Les 2 lampes sont
traversées par la même intensité
de courant I.
Si la lampe L
1
a une résistanceR
1
U
1
= R
1
x I
La lampe L

2
une résistance R
2
,
U
2
= R
2
x I
La tension :
U = U
1
+ U
2
L
1
L
2
1 : montage en série
L
1
L
2
2 : montage en parallèle
Les lampes L
1
et L
2
s'allument
ou s'éteignent en même temps.
Mais si l'une est hors d'usage,
l'autre peut s'allumer.
I = I
1
+ I
2
U
1
= U
2
I
I
I
1
I
2

(contre-plaqué)
-Scie à
bois
-Couper une
tablette ou une
réglette sur du
bois tendre (ou
chercher une
chute de
contre plaqué).
01
Réalisation
du support
Fixation
U
1
=
R
1
xI
U
2
=R
2
xI
U
1
=
R
1
x I
1
U
2
= R
2
x I
2
G
K
G
K
21
En s'inspirant de la fiche technique, réaliser
un panneau électrique pour une expérience
sur le
montage en série et le montage en parallèle.
Fiche technique
N°
Phase
Sous
phase
Matériaux
Outils
Procédure
Représentation
-Découpe
du
panneau
Bois tendre
des fils et
des vis
-vis en acier de
taille adapté
(environ 1cm de
long)
-ampoule de 2,5V
-fils souples de
faible section
Tourne
vis
Fixer les fils
sur les 3vis et
fixer les vis
sur le bois de

façon à
immobiliser
l’ampoule.
02
Réalisation
du boîtier des
piles
Réalisation du
cylindre
Papier épais
Ciseaux
règle
Voir
réalisation du
cylindre
03
Montage de
l’ensemble
boîtier + pile
+ fils
Montage
du
panneau
Scotch
3 ampoules de 3V
2 piles de 1,5V
fils
Ciseaux
A l’aide de
scotch fixer
les 2 fils aux
bornes des
piles dans le
boîtier
22

Activité 9 : Réalisation expérimentale d’une boussole

Matériels nécessaires :
1 récipient non métallique
1 tige ou une lame mince magnétisable
1 flotteur (liège ; polystyrène expansé…)
1 aimant
N
S

L’aiment est un matériau qui a la propriété d’attirer certains métaux. Il présente deux pôles (nord ; sud).

La terre se présente comme un gros aimant ayant également son pôle nord au nord et son pôle sud au sud.

Quand on dépose dessus une aiguille aimantée, elle voudrait se présenter parallèlement à l’axe nord - sud et dans la même disposition, mais des problèmes d’adhérence au sol l’en empêcherait.
N
S
Aiguille aimantée
Terre

Fiche technique :

En s’inspirant de la fiche technique, réaliser un dispositif expérimental de simulation de la boussole.

N°
Phase
Matériaux
Outils
Procédure
Représentation
01
Remplissage du
récipient
Remplir à moitié le récipient
02
Aimantation de
l’aiguille
Aiment
Frotter un seul bout avec le pôle
nord (si on frotte le bout avec le pôle
sud, l’aiguille prendra le sens sud)
S
N
03
Expérimentation
Planter horizontalement l’aiguille
dans le flotteur en veillant à
l’équilibre. Placer le flotteur avec
son aiguille sur la surface de l’eau et
au milieu du récipient
Récipient vu
de dessus
S N
23

V. Exercices d’évaluation

A partir de fiches techniques distribuées, confectionner le matériel et proposer une exploitation pédagogique possible.

Conclusion

La confection de matériel didactique dépend en grande partie de l’esprit de créativité de l’enseignant. Ce dernier doit être capable de faire une bonne lecture du programme en vigueur, de trouver dans son environnement des matériaux locaux de récupération pouvant lui permettre de fabriquer un matériel simple et pertinent. Il est conseillé de constituer une banque de matériels didactiques dans un établissement. Les enseignants qui se trouvent dans une même zone peuvent échanger du matériel où même organiser des journées de partage où une foire annuelle.

Notons pour terminer que le matériel aussi pertinent soit-il n'est que ce que l'enseignant en fait.

Références bibliographiques

-Fascicule PDRH2 (Formation prat

EST DE POSITIONNEMENT

Avant d'aborder ce module, réalise en une heure les tâches suivantes :

N.B. Rédige tes réponses dans ton cahier de formation.

1 Définis les termes suivants :

- matériel didactique
- support pédagogique

2 Dessine le patron des solides suivants : cube - pavé droit - cylindre.

3 Propose un matériel simple pour situer le nord

4 Dessine un montage électrique en série

5 Dessine un montage électrique en parallèle.

Après étude complète du module, tu es invité

11

Activité 4 : Le tangram

Matériaux

Outils

Procédure

Utilisation

Prolongement

Carton : calendrier, Papier canson, cartoline etc....

Crayon, règle, Gomme, ciseaux.

1. Trace un carré ABCD de 10 cm de côté.

(e) à reprendre les activités pour apprécier l'évolution de tes compétences.

I.

CLARIFICATION DE CONCEPTS: LES MATERIELS DIDACTIQUES ET SUPPORTS PEDAGOGIQUES

Ils sont des auxiliaires indispensables à l'action pédagogique mais ne sauraient en aucune façon se substituer à l'enseignant. Ils ne valent que par l'utilisation que l'enseignant en fait.

Quelle que soient leur quantité et leur qualité, il lui appartient de mettre en œuvre tout son génie pédagogique pour en faire des outils d'appoint au service de l'activité pédagogique. La manière dont ces outils sont utilisés conditionne l'efficacité de nos enseignements apprentissages, et l'impact des savoirs enseignés en dépend largement.

Matériel didactique : moyen matériel maniable qu'on peut utiliser pour organiser un enseignement dans une discipline donnée (balance, boussole, thermomètre...)

Support pédagogique : moyen matériel ou intellectuel sur lequel on s'appuie pour

2. Place E milieu de [AB], placer F milieu de [AD], tracer [EF].

3. Trace les diagonales, place G milieu de[EF]efface [AG].

Les diagonales se coupent en H.

4. place I, le milieu de [DH], trace [FI]

5. Place J, le milieu de [BH].tracer [GJ]

6. Découpe :

- [FE]
- [DB]
- [HC]

•

[FI]

- [GH] et [GJ].

1. Former des ensembles (carré triangles, losange...)
2. Réaliser les figures telles que trapèze rectangle, trapèze isocèle, parallélogramme.
3. Introduire la notion d'unité de mesure des aires.
4. comparer les aires des figures du tangram.
5. Chercher les axes de symétrie dans les pièces du tangram.

Reproduis des figurines pour réaliser des tableaux de décoration.

12

Activité 5 : Réalisation d'une maquette du cube et du pavé droit

Le cube

Fiche technique :

N°	Phase	Matériaux	Outils	Procédure
01	Traçage du développement du corps du cube	Feuille de papier, papier canson, carton etc...	Crayon, règle graduée, équerre	- trace 06 carrés égaux dans la même disposition que le dessin ci-dessous. - dessine les bandes de collage en traits interrompus
02	Découpage de la figure obtenue		Ciseaux, lames, cutter etc....	- découpe le contour de la figure obtenue qui s'appelle le « patron » du cube.
03	Formation du cube			- rabats les faces 2 et 3 sur la face 1 - rabats la face 6 sur la face 5 - appuie sur les arêtes intersection des faces de façon à les rendre nettes - positionne les faces de façon à obtenir un cube
04	Collage	Colle blanche, ruban adhésif	Pinceaux, bâtonnet.	- joints les arêtes qui correspondent - mets de la colle ou du ruban adhésif

sur les bandes de collage et procéder au collage
05
Séchage
Laisse
sécher quelques minutes.
Remarques
:
-
Les six faces ainsi positionnées constituent le patron. Les faces sont alignées verticalement et horizontalement. La face 6 du cube peut occuper quatre positions (celle qu'elle occupe ici, au dessus de la face 2, à gauche de la face 4, en dessous de la face 3. Ces quatre positions constituent chacune, une possibilité pour le patron.
-
Les rectangles en traits interrompus courts (pointillé) sont les bandes de collages
1
2
4
5
3
6
13
Le pavé droit
Fiche technique
:
N°
Phase
Matériaux
Outils
Procédure
01
Traçage du
développement
du pavé
droit
Feuille de
papier, papier
canson, carton
etc...
Crayon, règle
graduée,
équerre
-
trace
04
rectangles
égaux deux à deux
(1 et 6 et 4 et5) dans la même disposition
que la figure
ci
-
dessous
-
trace 2 autres figures carrées ou rectangles
(elles dépendent des
dimensions des figures précédentes)
-
dessine les bandes de collages (en traits interrompus courts)
02
Découpe de la
figure
obtenue
Ciseaux,
lames, cutter
etc....
-
découpe la figure obtenue
qui est le
«
patron
» du pavé droit
03
Formation du
pavé
droit
-
rabats les faces 2 et 3 sur la face 1
-
rabats les faces 6 et 5 sur la face 1
-
appuie sur les arêtes intersection des faces de façon à les rendre nettes
-
positionne
les faces de façon à obtenir
un pavé droit
04
Collage
Colle blanche,
ruban adhésif
Pinceaux,
bâtonnet.
-
joins
les bords des faces
correspondantes
-
mets
de la colle ou du ruban adhésif sur
les bandes de collage
coller
-
procède
au collage des faces
correspondantes
.
05
Séchage
Laisse

sécher quelques minutes.

Les remarques précédentes sont valables pour le pavé droit.

1
4
3
5
6
2
14

Activité 6:
Maquette du cylindre

En te basant sur la fiche technique, réalise le cylindre représenté ci-dessous

Fiche technique
:
N°
Phase
Matériaux
Outils
Procédure
01
Traçage du développement du corps du cylindre
Feuille de papier, papier canson, carton etc…
Crayon, règle graduée, équerre
- trace un rectangle
- trace les 2 cercles de base
Remarque : la longueur du rectangle est égale à la circonférence du cercle de base
Commence par le cercle et termine par le rectangle.
02
Découpe des surfaces obtenues
Ciseaux, lames, cutter etc….
- découpe le rectangle (prévoir la bande de collage)
- découpe les cercles de base (prévoir des bandes de collage)
03
Formation du cylindre
- enroule le rectangle de façon à former un cylindre.
- joints les 2 bords et colle.
04
Collage
Colle blanche, ruban adhésif
Pinceaux, bâtonnet.
- joindre les bords du rectangle
- mets de la colle ou du ruban adhésif sur les bandes de collage
- procède au collage du patron
05
Séchage
Laisser sécher quelques minutes.
Technique de calcul des surfaces
Π x D
Hauteur
15

En t’inspirant de la fiche technique, réalise un panneau électrique pour une expérience sur le montage en série et le montage en parallèle.

Fiche technique
N°
Phase
Sous phase
Matériaux
Outils
Procédure
Représentation
01
Réalisation du support
- Découpe du panneau
Bois tendre (contre-plaqué)
- Scie à bois

-
Coupe
une
tablette ou
une réglette
sur du bois
tendre (ou
cherche
une
chute de
contre
plaqué).
Fixation
des fils et
des vis
-
vis en acier de
taille adapté
(environ 1cm de
long)
-
ampoule de
2,5V
-
fils souples de
faible section
Tourne
vis
-
fixe les fils
sur les 3vis
-
fixe
les vis
sur le bois de
façon à
immobiliser
l'ampoule.
02
Réalisation
du boîtier
des piles
Réalisation
du cylindre
Papier épais
Ciseaux
règle
voir
réalisation du
cylindre
03
Montage de
l'ensemble
boîtier +
pile + fils
Montage
du panneau
Scotch
3 ampoules de
3V
2 piles de 1,5V
fils
Ciseaux
-
fixe les 2
fils aux
bornes des
pile

Electrical Trade Theory

Lecturer Guide

ELECTRICAL TRADE THEORY

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& Jan Randewijk

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ISBN 978-0-63910-339-

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Published by Future Managers (Pty) Ltd PO Box 13194, Mowbray, 7705 Tel (021) 462 3572 Fax (021) 462 3681 E-mail: info@futuremanagers Website: futuremanagers

Lecturer guidance

1. General aims

####### e general aims of this course is to equip students with relevant theoretical

####### knowledge to enable them to integrate meaningfully into:

- an electrical apprenticeship;
- an electrical learnership;
- an electrical contracting environment; or
- a power utility environment.

2. Specific aims

####### Students should acquire in-depth knowledge of the following subject outcomes:

- Alternating current circuit theory
- Conductors, insulators and cables
- Electrical reticulation
- Switchgear and protective devices
- Batteries
- Direct current machines
- Alternating current machines
- Transformers
- Earthing
- Measuring instruments
- Renewable energy.

3. Prerequisite

####### Students must have passed N1 Electrical Trade eory.

4. Duration

####### e duration of this course is one trimester full-time or part-time.

5. Evaluation

####### 5 Trimester mark

####### Students will write TWO formal class tests and must obtain a minimum trimester

####### mark of 40% in order to qualify to write the final examination. e trimester mark

####### shall be calculated as follows:

####### Trimester mark = 30% of Test 1 + 70% of Test 2

6. General information

####### e regulations as prescribed in the South African National Standard

####### (SANS 10142-1), as amended, must be used with each relevant section of this

####### curriculum.

####### All symbols and units of measurement must be in accordance with the following:

- IEC (International Electrotechnical Commission)
- SI (International System of Units).

####### Practical examples, realistic values and current data must be used in all calculations

####### and explanations.

####### Neat, fully labelled and large drawings must be presented when such are required.

####### Students' artistic ability is not to be evaluated.

####### Students should be encouraged to provide in their answers the number of facts

####### according to the number of marks allocated.

####### For calculation-type questions, the following must be done:

- State the formula to be used.
- Show the substitution.
- Round off all answers to three decimal places.
- Show the SI unit.

7. Work schedule

Week Topic Content Hours 1 **Module 1** Alternating current theory

1 Dynamically induced emf 1 Statically induced emf 1 e power triangle 1 ree-phase circuits

10 hours

2 **Module 2** Conductors, insulators and cables

2 Conductors 2 Insulators 2 Cables

10 hours

3 **Module 3** Electrical reticulation

3 Reticulation networks 3 Generation 3 Transmission 3 Distribution

10 hours

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Week Topic Content Hours 4 **Module 4** Switchgear and protective devices

4 Switchgear 4 Switchgear – isolating 4 Switchgear – control 4 Protective devices

10 hours

5 **Module 5** Batteries

5 Gel batteries 5 Lead-acid battery 5 Lithium-ion batteries

10 hours

6 **Module 6** Direct current machines

6 Function and construction 6 Operation of DC motors 6 Operation of DC generators

10 hours

7 **Module 7** Alternating current machines

7 Types of AC machines 7 Single-phase motors 7 ree-phase induction motors

10 hours

8 **Module 8** Transformers

8 Function and construction of a single- phase transformer 8 Operation 8 ree-phase transformers

10 hours

9 **Module 9** Earthing

9 e earthing chain 9 Earthing of overhead lines 9 Earthing of underground cables

10 hours

10 **Module 10** Measuring instruments

10 Low-voltage measurement 10 High-voltage measurement 10 Range extension 10 Digital measuring instruments

5 hours

Module 11 Renewable energy

11 Renewable energy 5 hours

TOTAL 100 hours

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LESSON

CONTENT/OUTCOMES TO BE COVERED THIS WEEK

LIST OF EXAMPLES TO BE DONE IN CLASS BY THE LECTURER TO EXPLAIN THE OUTCOME/CONCEPT

FACILITATION

METHOD (PLEASE TICK)

TEACHING RESOURCES/AIDS

(PLEASE TICK)

STUDENT ACTIVITY

(EXERCISE IN

TEXTBOOK/ADDITIONAL SUPPORTING TASK) TO BE DONE THIS WEEK

WEEK 1

Lecture

White board/OHP

Group work

Models

Demonstration

Handouts

Simulation

Multimedia

INTRODUCTION TO LESSONSRECAPPING/REINFORCEMENT

N2 Electrical Trade Theory Lecturer Guide xi

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LESSON

CONTENT/OUTCOMES TO BE COVERED THIS WEEK

LIST OF EXAMPLES TO BE DONE IN CLASS BY THE LECTURER TO EXPLAIN THE OUTCOME/CONCEPT

FACILITATION

METHOD (PLEASE TICK)

TEACHING

RESOURCES/AIDS

(PLEASE TICK)

STUDENT ACTIVITY

(EXERCISE IN

TEXTBOOK/ADDITIONAL SUPPORTING TASK) TO BE DONE THIS WEEK

WEEK 2

Lecture

White board/OHP

Group work

Models

Demonstration

Handouts

Simulation

Multimedia

INTRODUCTION TO LESSONSRECAPPING/REINFORCEMENT

N2 Electrical Trade Theory Lecturer Guide xiii

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LESSON

CONTENT/OUTCOMES TO BE COVERED THIS WEEK

LIST OF EXAMPLES TO BE DONE IN CLASS BY THE LECTURER TO EXPLAIN THE OUTCOME/CONCEPT

FACILITATION

METHOD (PLEASE TICK)

TEACHING

RESOURCES/AIDS

(PLEASE TICK)

STUDENT ACTIVITY

(EXERCISE IN

TEXTBOOK/ADDITIONAL SUPPORTING TASK) TO BE DONE THIS WEEK

WEEK 4

Lecture

White board/OHP

Group work

Models

Demonstration

Handouts

Simulation

Multimedia

INTRODUCTION TO LESSONSRECAPPING/REINFORCEMENT

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LESSON

CONTENT/OUTCOMES TO BE COVERED THIS WEEK

LIST OF EXAMPLES TO BE DONE IN CLASS BY THE LECTURER TO EXPLAIN THE OUTCOME/CONCEPT

FACILITATION

METHOD (PLEASE TICK)

TEACHING RESOURCES/AIDS

(PLEASE TICK)

STUDENT ACTIVITY

(EXERCISE IN

TEXTBOOK/ADDITIONAL SUPPORTING TASK) TO BE DONE THIS WEEK

WEEK 5

Lecture

White board/OHP

Group work

Models

Demonstration

Handouts

Simulation

Multimedia

INTRODUCTION TO LESSONSRECAPPING/REINFORCEMENT

xvi Lecturer guidance

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LESSON

CONTENT/OUTCOMES TO BE COVERED THIS WEEK

LIST OF EXAMPLES TO BE DONE IN CLASS BY THE LECTURER TO EXPLAIN THE OUTCOME/CONCEPT

FACILITATION

METHOD (PLEASE TICK)

TEACHING RESOURCES/AIDS

(PLEASE TICK)

STUDENT ACTIVITY

(EXERCISE IN

TEXTBOOK/ADDITIONAL SUPPORTING TASK) TO BE DONE THIS WEEK

WEEK 7

Lecture

White board/OHP

Group work

Models

Demonstration

Handouts

Simulation

Multimedia

INTRODUCTION TO LESSONSRECAPPING/REINFORCEMENT

N2 Electrical Trade Theory Lecturer Guide xvii

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LESSON

CONTENT/OUTCOMES TO BE COVERED THIS WEEK

LIST OF EXAMPLES TO BE DONE IN CLASS BY THE LECTURER TO EXPLAIN THE OUTCOME/CONCEPT

FACILITATION

METHOD (PLEASE TICK)

TEACHING

RESOURCES/AIDS

(PLEASE TICK)

STUDENT ACTIVITY

(EXERCISE IN

TEXTBOOK/ADDITIONAL SUPPORTING TASK) TO BE DONE THIS WEEK

WEEK 8

Lecture

White board/OHP

Group work

Models

Demonstration

Handouts

Simulation

Multimedia

INTRODUCTION TO LESSONSRECAPPING/REINFORCEMENT

N2 Electrical Trade Theory Lecturer Guide xix

This page may be photocopied.

LESSON

CONTENT/OUTCOMES TO BE COVERED THIS WEEK

LIST OF EXAMPLES TO BE DONE IN CLASS BY THE LECTURER TO EXPLAIN THE OUTCOME/CONCEPT

FACILITATION

METHOD (PLEASE TICK)

TEACHING

RESOURCES/AIDS

(PLEASE TICK)

STUDENT ACTIVITY

(EXERCISE IN

TEXTBOOK/ADDITIONAL SUPPORTING TASK) TO BE DONE THIS WEEK

WEEK 10

Lecture

White board/OHP

Group work

Models

Demonstration

Handouts

Simulation

Multimedia

INTRODUCTION TO LESSONSRECAPPING/REINFORCEMENT

This afternoon's online lesson is based on the Construction Level 2 subject for NC(V) students.

The topic: Measuring and Setting Out.
Open

This morning's online lesson is based on the Plant and Equipment Level 3 subject for NC(V) students.

The topic: Internal Combustion Engine
Open

Open

This morning's online lesson is based on the Mathematics Level 4 subject for NC(V) students.

The topic: Integration (Part 2)
Open

This afternoon's online lesson is based on the Construction Level 2 subject for NC(V) students.

The topic: Differentiation Rules and Equation of Tangents
Open

This morning's online lesson is based on the Fitting and Turning Level 2 subject for NC(V) students.

The topic: Milling Machine

N1 Topics

N1 Electrical Trade Theory

Open

N1 Engineering Drawing
Open

N1 Motor Trade Theory
Open

N1 Industrial Electronics
Open

N1 Mathematics
Open

N1 Bricklaying and Plastering Theory
Open

N1 Building Drawing
Open

N1 Fitting & Turning Theory Module 8
Open

N1 Fitting & Machining - Module 14 - Centre Lathes
Open

N2 Topics

N2 Mathematics
Open

N2 Motor Trade Theory
Open

N2 Electrical Trade Theory
Open

N2 Engineering Drawing
Open

N2 Engineering Science
Open

N2 Industrial Electronics
Open

N2 Fitting & Machining Theory - Module 10
Open

N2 Fitting & Machining Theory V-Belts
Open

N1 Fitting & Machining Theory Module 13 Cutting Tools
Open

N2 Electrical Trade Theory - Module 6 - Protection
Open

N2 Fitting & Machining Theory - Module 14 Reduction Gearboxes
Open

N3 Topics

N3 Engineering Science
Open

N3 Industrial Electronics
Open

N3 Mathematics
Open

N3 Mechanotechnology
Open

N3 Electrical Trade Theory
Open

N3 Mechanotechnology Module 8
Open

N3 Mechanotechnology - Module 10 Pneumatics
Open

N3 Electrical Trade Theory
ZIP

N4 Topics

N4 Industrial Electronics
Open

N4 Mathematics
Open

N4 Mechanotechnics
Open

N4 Child Health
Open

N4 Daycare Personnel
Open

N4 Electrotechnics
Open

N4 Catering Theory and Practical
Open

N4 Nutrition and Menu Planning
Open

N4 Sanitation and Safety
Open

N3 Electrotechnology
Open

N4 Human Resource Management
Open

N4 Introduction to Financial Accounting
Open

N4 Public Administration
Open

N4 Educare Didactics
Open

N4 Education
Open

N4 Computer Guide Practice Du Toit
Open

N4 Computer Practice De Villiers
Open

N4 Computerised Financial Systems
Open

N4 Entrepreneurship & Business Management
Open

N4 Financial Accounting
Open

N4 Education Module 1 Video
Open

L4 Systems Analysis & Design Topic 3
Open

N4 Mass Media Communication Part 1 - Video
Open

N4 Mass Media Communication Part 2 - Video
Open

N4 Mass Media Communication Part 3 - Video
Open

N4 Mass Media Communication Part 4 - Video
Open

N4 Mass Media Communication Part 5 - Video
Open

N4 Mass Media Communication Part 6 - Video
Open

N4 Education Module 1
Open

N4 Management Communication - Minutes of a meeting
Open

N4 Management Communication - Module 5
Open

N4 Management Communication - Module 6
Open

N4 Marketing Management Module 3
Open

Marketing N4 1 - Video
Open

Marketing N4 2 - Video
Open

Marketing N4 3 - Video
Open

Marketing N4 4 - Video
Open

Marketing N4 5 - Video
Open

Marketing N4 6 - Video
Open

N5 Topics

N5 Marketing Management Module 1
Open

N5 Marketing Management Module 2
Open

N5 Marketing Management Module 3
Open

N5 Marketing Management Module 4
Open

N5 Mathematics
Open

N5 Electrotechnics
Open

N5 Industrial Electronics
Open

N5 Sales Management
Open

N5 Human Resource Management
Open

N5 Human Resource Training
Open

N5 Municipal Administration
Open

N5 Public Administration
Open

N5 Public Relations
Open

N5 Computer Guide Practice Du Toit
Open

N5 Computerised Financial Systems
Open

N5 Cost and Management Accounting
Open

N5 Entrepreneurship & Business Management
Open

N5 Financial Accounting
Open

N5 _ N6 Public Finance
Open

N5 Computer Guide Practice De Villiers
Open

N5 Daycare Communication
Open

N5 Educational Psychology
Open

N5 Sales Management Module 10
Open

Office Practice N5 Topic 7 Insurance
Open

Office Practice N5 Topic 7 Tele Communication
Open

N5 Computer Practice Theory
Open

N5 Sales Management Module 6
Voice Note
Open

N5 Sales Management Module 11
Open

N5 Computer Practice - Mail Merge & Access
Open

N5 Marketing Management
Open

N6 Topics

Information Process N6 Topic 9 Flow Charts
Open

LR N6 Module 3 - Collective bargaining
Open

N6 Electrotechnics
Open

N6 Mathematics
Open

N6 Daycare Communication
Open

N6 Municipal Administration
Open

HLANGABEZA MT (MUNICIPAL ADMIN N6)
Open

N6 Public Administration
Open

N6 Public Law
Open

N6 Sales Management
Open

N6 Daycare Management
Open

N6 Human Resource Management
Open

N6 Human Resource Training
Open

N6 Income Tax
Open

N6 Marketing Communications
Open

N6 Marketing Research
Open

N6 Computer Practice
Open

N6 Computerized Financial Systems
Open

N6 Cost and Management Accounting
Open

N6 Entrepreneurship & Business Management
Open

N6 Financial Accounting
Open

N6 Educare Didactics
Open

N6 Psychology Module 3
Open

N6 Sales Management Voice Notes
Open

INFORMATION PROCESSING N6 financial statement (TOPIC 10)
Open

IP N6 FINANCIAL STATEMENTS
Open

Various Topics

Level 2

Maths Lit L2 Topic 2 Voice Note
Open

New Venture Creations L2 Topic 2 Summary Slide Show - Future Managers Mrs Strydom
Open

LIFE ORIENTATION L2
Open

OFFICE PRACTICE LEVEL 3 LESSON 1.22
Open

L2 EBM Topic 2
Open

L2 Animal Production Poultry Feeding
Open

L2 New Venture Creation Module 1
Open

L2 New Venture Creation Module 2
Open

L2 New Venture Creation Module 3
Open

L2 English FAL - Business letters
Open

L2-L4 English FAL Intervention Excercises
Open

MacMillan L2 English FAL Module 1
Open

MacMillan L2 English FAL Module 2
Open

L2 Business Practice - Topic 3
Open

L2 Business Practice Module 10
Open

L2 English FAL Module 3
Open

L2 Transport Economics
Open

L2 Transport Operations - Typical Operations across various transport modes
Open

L2 Physical Science - Electricity & Magnetism
Open

L2 Plant Production - Module 1 - Lesson 2 Vegetable Production
Open

L2 Plant Production - Module 1 - Vegetable Production
Open

L2 Soil Science - Soil & their Components
Open

L2 Animal Production - Diseases in Poultry
Open

L2 Food Preparation - Module 10 Part 1
Open

L2 Food Preparation - Module 10 Part 2
Open

L2 Food Preparation - Module 10 Part 3.1
Open

L2 Food Preparation - Module 10 Part 3.2
Open

L2 Food Preparation - Module 10 Part 4
Open

L2 Food Preparation - Module 10 Part 5
Open

L2 Food Preparation - Module 10 Part 6
Open

L2 Food Preparation - Module 10 Part 7.1
Open

L2 Food Preparation - Module 10 Part 7.2
Open

L2 Food Preparation - Module 10 Part 8,9,10
Open

L2 Agribusiness - Module 2 - Importance of Marketing
Open

L2 English FAL - Topic 3 - Blog Writing
Open

L2 Life Orientation - Substance Abuse (Zipped File, please download and unzip)
ZIP

L2 Plant Production - Unit 4 Choosing Vegetable Crops
Open

L2 Agribusiness - Module 2 - Gaining Access to Markets
Open

L2 Life Orientation - Module 7 Balanced Lifestyle
Open

L2 Life Orientation - Module 8 Substance Abuse
Open

L2 Life Orientation - Module 9 Human Sexuality
Open

L2 Life Orientation - Module 10 Fire Safety Measures
Open

L2 Plant Production - Unit 4 Choosing Vegetable Crops
Open

Level 3

English L3 Topic 3
Open

ECDE L3 Bipolar Juction Transistor VIDEO
Open

ECDE L3 Module 4&5 VIDEO
Open

English L3 Topic 4 Voice File
Open

L3 Electrical Principles and Construction Topic 4
Open

L3 Marketing Communication Topic 3
Open

Future Managers Presentations for New Venture Creation L3 Module 1
Open

Future Managers Presentations for New Venture Creation L3 Module 2
Open

Future Managers Presentations for New Venture Creation L3 Module 3
Open

Future Managers Presentations for New Venture Creation L3 Module 4
Open

L3 LO - Health & Wellbeing
Open

L3 Soil Science - Fertilization of Soils Zipped File. Please download and unzip
ZIP

L3 Office Practice - Cancelling & Postponing Appointments
Open

L3 Office Practice Topic 4 Module 10
Open

L3 Transport Economics - Macro & Micro View
Open

L3 Animal Production - Module 2 Rearing Practices for Lambs
Open

L3 Animal Production - Topic 2 Wool bearing sheep breeds
Open

L4 English FAL Topic 3 - Argumentative Writing
Open

L3 Physical Science - Electromagnetism
Open

L3 Soil Science - Soil Sampling Procedures Zipped File. Please download and unzip
ZIP

L3 Animal Production - Module 2 - Unit 2 Weaning
Open

L3 Physical Science - Electromagnetic Induction
Open

L3 Animal Production - Module 2 Unit 3 - Rearing Practice for Ewes and Rams
Open

L3 Life Orientation - Module 4
Open

L3 Life Orientation - Module 5
Open

L3 Life Orientation - Module 6
Open

L3 Life Orientation - Module 7
Open

L3 Life Orientation - Module 8
Open

L3 Life Orientation - Module 9
Open

L3 Life Orientation - Module 10
Open

L3 Mathematics - Space, Shape and Orientation
Open

L3 Agribusiness - Module 2 Topic 1
Open

Level 4

Maths Lit L4 Module 1.2.6
Voice File
Open

L4 English E-Book LADIES' DETECTIVE AGENCY
Open

LO Level4 Topic3 Part1 Voice File
Open

LO Level4 Topic3 Part2 Voice File
Open

LO Level4 Topic3 Part3 Voice File
Open

LO Level4 Topic3 Part4 Voice File
Open

LO Level4 Topic3 Part5 Voice File
Open

LO Level4 Topic3 Part6 Voice File
Open

LO Level4 Topic3 Part7 Voice File
Open

System Analysis & Design Level4 Topic3 Lesson1
Open

Future Managers Presentations for L4 Personal Assistance Module 1
Open

Future Managers Presentations for L4 Personal Assistance Module 2
Open

Future Managers Presentations for L4 Personal Assistance Module 3
Open

Future Managers Presentations for L4 Personal Assistance Module 4
Open

Construction Supervision L4
Open

L4 Electrical Principles & Practice - Topic 4
Open

N4 Electrotechnics
Open

L4 Marketing Module 5
Open

L4 Animal Production - Cattle Breeds
Open

L4 Personal Assistance Module 6
Open

L4 Personal Assistance Module 7
Open

L4 Life Orientation Topic 3
Open

L4 Freight Logistics - Government Procurement Process

L4 Life Orientation Topic 3

L4 Life Orientation Topic 3

L4 Marketing Communication Topic 4
Open

L4 Marketing Communication Topic 5
Open

L4 Marketing Communication Topic 6
Open

L4 Freight Logistics - Government Procurement Process
Open

L4 Transport Economics - The transport market and the Economy
Open

L4 Transport Operations - Capacity Planning, Optimisations and route scheduling
Open

Mathematics L4
Open

L4 Advanced Plant Production - Topic 1 - Plant Propagation
Open

L4 System Analysis & Design Part 1
Open

L4 System Analysis & Design Part 2
Open

L4 System Analysis & Design Part 3
Open

L4 System Analysis & Design Part 4
Open

L4 System Analysis & Design Part 5
Open

L4 System Analysis & Design Part 6
Open

L4 System Analysis & Design Part 7
Open

L4 English FAL Topic 3 - Reflective Writing
Open

L4 Agribusiness - Integrated Management of a Small Agricultural Enterprise Part 1
Open

L4 Agribusiness - Part 2 Answers to Assessment
Open

L4 Life Orientation - Module 10 Advocate Road Safety Measures
Open

L4 Life Orientation - Module 11 Describe Workers Rights and Responsibilities
Open

L4 Life Orientation SO3.3 Zipped File-Please download and unzip)
ZIP

L4 Construction Supervision - Topic 6
Open

L4 Agribusiness - Presentation 2 Unit 1.2
Open

L4 Agribusiness - Presentation 3 Unit 1.2
Open

Marketing Modules

MODULE 1 PRODUCT POLICY
Open

MODULE 2 - DISTRIBUTION POLICY
Open

MODULE 3 - PRICING POLICY
Open

MODULE 4 - PROMOTIONAL POLICY
Open

Microsoft OFFICE and other misc modules

CP, IP & ODP Multilevel Numbering Part 1
Open

CP, IP and ODP Multilevel Numbering Part 2
Open

PLP Mathematics - Module 2 Factorisation
Open

Welding - Shielded Metal Arc Welding
Open

Unit Standard 116936 End User Computing - Microsoft Access
Open

PLP Science - Unit 2.3 Heat & Temperature
Open

Unit Standard 91761 Electrical Phase 1
Open

Unit Standard 261659 Build Masonry Super Structures using Solid Units
Open

PLP English Positive & Negative Sentences
Open

Skills Boilermaking Lifting Techniques
Open

Skills Boilermaking - Lay out and mark-off pipe work sections
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Engineering NQF levels you need to become an electrician

The N1, N2 and N3 national certificates for electrical engineering are three distinct certificates that provide sufficient hours of training and learning to become an electrician registered as an electrical tester for single phase. The duration of each level is three months and completing all three levels (N1 - N3) takes one year. The student can then study further NQF levels such as N4, N5 and N6 and qualify for a National Diploma. If you would like to become an installation electrician, you will need NQF levels N1, N2, N3 and N4. A master electrician would need NQF levels N1,N2, N3, N4 and N5.

In addition, an electrician can choose to study and register for three classifications that enable them to work with different electric installation phases: Single-Phase (220 volts), Three-Phase (380 Volts) and a master electrician who is qualified to work with higher voltages and in more challenging environments.

Depending on the classification chosen above, the electrician will need to determine what documentation should be sent to the department of labour and therefore which qualifications and testing are required.

The Department of Labour (DOL) demands that you study specific NQF levels before you can register with them and obtain your wiremans license. This is why its important to ensure you are aware of what NQF levels you must study in order to register with the DOL as the correct electrician type (Correct legal person).

The DOL requirements for registering as one of the three types of electricians are illustrated below. This will help you determine which NQF levels you need to study.

Type of electrician	NQF level required by DOL
Electrical Tester for single phase.	NQF 1,2,3
Installation Electrician (three-phase)	NQF 1,2,3,4
Master Electrician	NQF 1,2,3,4,5

An introduction to the N1, N2 and N3 certificates

The Electrical Engineering certificates N1, N2 and N3 are designed to give students a solid foundational competency in Electrical Engineering fundamentals. The objective is the application of knowledge, typically in the form of science, mathematics, and empirical evidence to the innovation, design, construction, operation, and maintenance of structures, machines, and materials in the Electrical Engineering field.

Included in the certificates is study material that will cover the principles required to solve engineering problems such as heavy and light current. Heavy current includes the distribution of electricity, domestic wiring in civil and industrial industries. Light current includes fields such as digital electronics and industrial electronics.

Entry requirements include foundational competencies in basic math and physics. Read our guide that explains all the prerequisite study requirements before starting.

What qualification and work will I get after completing N1 - N3?

You will be able to take up employment in one of the following fields as an apprentice or student technician to gain the necessary industrial experience to be able to do a trade test. Please note that without completing the trade test and registering with the Department of Labour, you will not be able to work in the fields below.

- Electrical Engineering & Construction
- Industrial Engineering
- Process Control
- Digital Electronic Engineering
- Industrial Electronic Engineering

What job roles can I perform after completing the N1 - N3 certificates?

- Wireman (Electrician) - You will still need to satisfy the Department of Labour requirements before you can become a registered electrician.
- Assistant Electrician
- Industrial Electronic Assistant
- Assistant Foreman
- Maintenance Assistant
- Electrical Entrepreneur
- Controller/Inspector
- Building Trade related career
- Acoustic Technician
- Telecommunication
- Power Electronics
- Control and Instrumentation Technician
- Design Engineer

What job roles can I perform after completing the N3 - N6 certificates?

-

 Wireman (Electrician) - You will still need to satisfy the Department of Labour requirements before you can become a registered electrician.

  Electronic technician

  Computer technician

  Master electrician

  Electrical Designer

  Management & Inspection Technologist

  Radio Engineering

- Radar/Satellite/Television and Microwave Technician

Are the N1 - N6 certificates accredited?

When studying through one of the recommended learning colleges, you can guarantee that your certificate is accredited by Umalusi (Education standards) and registered by the Department of Higher Education and Training (DHET). These certificates are designed to improve your skills and enhance your career prospects in your chosen industry.

How long will it take to complete the NQF certificates?

NQF Level	Duration
N1	3 months.
N2	3 months.
N3	3 months.
N4	3 months.
N5	3 months.
N6	3 months.
Total:	18 months.

Once you have completed N1 to N6 and you have also spent 24 months working within the electrical engineering industry, you are eligible to apply for a national diploma in electrical engineering. Once you have the diploma, you can decide if you would like to continue studying further at a university.

N1

SAQA ID: 67109 - National Certificate in Electrical Engineering

The N1 electrical engineering certificate introduces you to the basic principles of electrical engineering and prepares you for further study in this field. This certificate can count towards a full national qualification as listed on the NQF. This is a foundational level certificate and part of a 3-level engineering programme. You will learn the mathematics, science and drawing skills that form the basis of all engineering trades. Learn the skills and techniques to research, design, install and test electrical and electronic equipment and supervise its manufacturing. The electrical trade involves the generation, distribution, and management of all appliances and installations that generate or use electrical energy.

View SAQA Qualification

This certificate is required by the Department of Labour when registering as one of the following legal persons (electricians):

-

▯ Electrical tester for single phase

▯ ▯ Installation electrician (Three phase)

- ▯ Master electrician

Study topics

-

▯ N1 Mathematics
▯ ▯ N1 Industrial Electronics

▯ ▯ N1 Engineering Science

- ▯ N1 Electrical Trade Theory

Entry requirements

-
- Read all the prerequisite requirements

N2

SAQA ID: 67375 - National Certificate in Electrical Engineering

This N2-level certificate builds on the knowledge and skills gained at N1 level, and further prepares you for working as an artisan in the field of electrical engineering. This course is a good option if you’ve already completed the N1 course, and you want to learn more of the skills you need to work with electrical circuits. This certificate is part of a 3-level engineering programme.

View SAQA Qualification

This certificate is required by the Department of Labour when registering as one of the following legal persons (electricians):

-

 Electrical tester for single phase

  Installation electrician (Three phase)

- Master electrician

Study topics

-

 N2 Mathematics
  N2 Industrial Electronics

  N2 Engineering Science

- N2 Electrical Trade Theory

Entry requirements

-

- Successful completion of the electrical N1 certificate course

N3

SAQA ID: 67491 - National Certificate in Electrical Engineering

This N3 Engineering Studies course builds on the knowledge and skills gained in the previous levels, and prepares you for a career as an artisan in the field of electrical engineering. When you study this course, you will learn more about the industry practices and administrative procedures in the electrical engineering environment. This certificate can count towards a full national qualification as listed on the NQF. This certificate is part of a 3-level engineering programme.

View SAQA Qualification

This certificate is required by the Department of Labour when registering as one of the following legal persons (electricians):

-

 Electrical tester for single phase

  Installation electrician (Three phase)

- Master electrician

Study topics

-

 N3 Mathematics
  N3 Industrial Electronics

  N3 Engineering Science

- N3 Electrical Trade Theory or Electro-technology

Entry requirements

-

- Successful completion of the electrical N2 certificate course

N4

SAQA ID: 66881 - National Certificate in Electrical Engineering

The N4 - N6 Electrical Engineering programme is a post-matric National Certificate programme. Students who complete this stand-alone certificate programme can go on to complete N5 and N6 and thereafter 18 months in a relevant workplace to qualify for the National Diploma in Electrical Engineering. Each certificate is a qualification on its own and is offered over a period of 3 months. Students can then enter into either a University of Technology to complete a degree qualification or into a workplace that requires the qualification. The Department of Higher Education will issue you with a National Certificate once you have passed each level e.g. N4, N5, N6. After completing your work experience you can apply for your National Diploma from the DHET at the campus where you have completed your N6 qualification.

View SAQA Qualification

This certificate is required by the Department of Labour when registering as one of the following legal persons (electricians):

-

 Electrical tester for single phase

  Installation electrician (Three phase)

- Master electrician

Study topics

-

 N4 Mathematics
  N4 Industrial Electronics

  N4 Engineering Science

- N4 Electrotechnics

Entry requirements

-

- Successful completion of the electrical N3 certificate course

N5

SAQA ID: 66960 - National Certificate in Electrical Engineering

The N4 - N6 Electrical Engineering programme is a post-matric National Certificate programme. Students who complete this stand-alone certificate programme can go on to complete N5 and N6 and thereafter 18 months in a relevant workplace to qualify for the National Diploma in Electrical Engineering. Each certificate is a qualification on its own and is offered over a period of 3 months. Students can then enter into either a University of Technology to complete a degree qualification or into a workplace that requires the qualification. The Department of Higher Education will issue you with a National Certificate once you have passed each level e.g. N4, N5, N6. After completing your work experience you can apply for your National Diploma from the DHET at the campus where you have completed your N6 qualification.

View SAQA Qualification

This certificate is required by the Department of Labour when registering as one of the following legal persons (electricians):

-

 Electrical tester for single phase

  Installation electrician (Three phase)

- Master electrician

Study topics

-

 N5 Mathematics
  N5 Industrial Electronics

  N5 Engineering Science

- N5 Electrotechnics

Entry requirements

-

- Successful completion of the electrical N4 certificate course

N6

SAQA ID: 67005 - National Certificate in Electrical Engineering

The N4 - N6 Electrical Engineering programme is a post-matric National Certificate programme. Students who complete this stand-alone certificate programme can go on to complete N5 and N6 and thereafter 18 months in a relevant workplace to qualify for the National Diploma in Electrical Engineering. Each certificate is a qualification on its own and is offered over a period of 3 months. Students can then enter into either a University of Technology to complete a degree qualification or into a workplace that requires the qualification. The Department of Higher Education will issue you with a National Certificate once you have passed each level e.g. N4, N5, N6. After completing your work experience you can apply for your National Diploma from the DHET at the campus where you have completed your N6 qualification.

View SAQA Qualification

This certificate is required by the Department of Labour when registering as one of the following legal persons (electricians):

-

▯ Electrical tester for single phase

▯ ▯ Installation electrician (Three phase)

- ▯ Master electrician

Study topics

-

▯ N6 Mathematics
▯ ▯ N6 Industrial Electronics

▯ ▯ N6 Engineering Science

- ▯ N6 Electrotechnics

Entry requirements

-

- Successful completion of the electrical N5 certificate course

---

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Electrical engineering entrance criteria in South Africa

HOW TO BECOME AN ELECTRICIAN COURSE OVERVIEW

- Getting started and checklist
- School grades and subjects
- Electrician bridging courses
- Engineering entrance criteria
- Picking the correct electrical phase
- National Qualifications Framework
- NQF levels you need
- Engineering Colleges in South Africa
- SANS 10142-1 national exam
- Wiremans Licence
- Electrical Tester for Single Phase
- Installation Electrician
- Master Electrician
- Education Authorities Glossary

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o you already know that you want to start a career in engineering, but you aren't sure about what route to take? Or are you struggling to decide whether you should enrol for a **technical engineering course** or an **engineering degree?** The best way to make sure you make the correct decision is to do thorough research on your different options.

Here are 9 differences that will help you compare a technical engineering qualification with an engineering degree:

1. Level of qualification

The most basic difference between a university degree and a technical engineering course such as a national certificate or diploma will be the level of qualification that you receive.

Click on the link to see where each type of qualification is ranked on the South African National Qualifications Framework (NQF): National Qualifications Framework (NQF) Levels

On its own, a difference in level of qualification doesn't mean much. What does matter, however, is how this relates to other factors such as those listed below:

2. Course content

A **degree in engineering** is often much more theoretical and academic, while a **technical engineering course** usually focuses on teaching students practical applications.

For example: An engineer with a degree will be better suited to a project management position at an automotive manufacturer, taking on the responsibility of assigning tasks, analysing production data, writing reports, and overseeing manufacturing processes.

The engineer with the technical qualification will, on the other hand, be the person who actually does the technical work. This will include things like calibrating machinery, testing processes, doing quality control, and maintaining machinery.

3. Specialisation

The **degree programmes** you generally find at universities in South Africa are broad, comprehensive programmes, such as:

- Civil Engineering
- Mechanical Engineering
- Process Engineering

Technical certificate and diploma programmes are often much more specialised, giving you a unique qualification in engineering fields such as:

- Millwright work
- Fitting and turning
- Boilermaking
- Motor mechanics

The benefit of specialisation is that you will have in-depth training in a specific field, qualifying you for a particular job. The drawback of this, however, is that you won’t be able to qualify for a wider range of positions within engineering with just that qualification.

4. Completion time

An **engineering degree** generally takes 4 years of full-time studying to complete. To attain your qualification, you have to complete all 4 years of study.

A **national certificate or diploma in engineering** is divided into separate courses, each taking 1 year to complete. For example: you can do an N1 in Motor Mechanics and receive your National Certificate before moving on to earning your N2 qualification.

To receive a national diploma in engineering, however, you also have to complete a learnership programme at an approved employer.

5. Places of study

A **degree in engineering** can only be attained at a university. A **technical qualification**, however, can be completed at a number of different institutions, including:

- TVET colleges
- Private distance learning colleges (such as Oxbridge Academy)
- Technical universities (universities of technology)

Each of these types of institutions also have their own entry requirements. Getting into a university is, for example, much more difficult than getting into a TVET college.

6. Affordability

One of the biggest factors that influences a lot of students’ decision-making is funding. Unfortunately, the fees at **South African universities** are notoriously high.

Colleges offering technical qualifications are generally much more affordable. Many colleges, including **Oxbridge Academy**, structure their fees in ways that make it easier for you to afford your studies, allowing you to:

- Pay for your course in interest-free monthly instalments.
- Enrol for a national qualification from as little as R490 per month.
- Receive a Special Merit Award to cover 25% of your next course’s fees if you pass your initial course with distinction.

If you have trouble funding your studies, download our FREE E-BOOK and learn all about bursaries, scholarships, student loans, and other funding options in South Africa:

7. Professional Registration

You have to be registered with the Engineering Council of South Africa (as is the case in most other countries as well) in order to:

- Perform consulting engineering work.
- Take responsibility for the performance of engineering work.
- Perform functions as laid down in certain statutes (e.g. the National Building Regulations).
- Become a full member of some recognised institutes.

Depending on your qualification, you will be able to register within a certain category of engineering, such as:

- Professional Engineer (Pr Eng)
- Professional Engineering Technologist (Pr Tech Eng)
- Professional Certificated Engineer (Pr Cert Eng)
- Professional Engineering Technician (Pr Eng Techni)

Your professional title and credentials will thus depend on the type of qualification you have.

8. Employment prospects

Several types of jobs require you to have a degree. These are often higher-level engineering jobs such as **civil engineering**, or more senior positions such as **project manager**.

However, a technical certificate or diploma will prepare you for a number of specialised positions. Take a look at the 10 Highest Paying Jobs You Can Go Into Without a Degree and you will see a number of specialist engineering professions (such as ‘electrical technician’) for which you only require a technical qualification.

Finding the course that suits you best

At the end of the day, it is not about whether a degree is better than a technical qualification or not. What really matters is what type of qualification suits your individual needs and circumstances best.

If you want to find out more about the engineering courses offered by Oxbridge Academy—and whether they suit your needs—you can call us on 021 110 0200.

Also Read:

- 5 Professions in demand in the technical engineering industry>
- Choose your engineering path

ENSURING THE EXPERTISE TO GROW SOUTH AFRICA

ECSA
https://www.ecsa.co.za › ECSADocuments › En...

by MA Dienga · 2022 — The scope of the *study* was the Higher Education. *Qualification* Sub-Framework (HEQSF) *qualifications* from National Framework of. *Qualifications*

DMS designs, produces and sells

Systems to Teach.

Search

Advanced search

- General and technological education
    - Grades 13-16
    - Grades 15-18
    - Grades 9-12
- Engineering Sciences
    - Grades 16-20
- Digital Systems
    - Grades 14-15
    - Grades 16-17
    - Grades 17-21
- Electrical engineering
    - Grades 14-15
    - Grades 16-17
    - Grades 17-21
- Industrial maintenance
    - Grades 14-15
    - Grades 16-17
    - Grades 17-21
- Automotive maintenance
    - Grades 14-15
    - Grades 16-17
    - Grades 17-21
- Process control
    - Grades 14-15
    - Grades 16-17
    - Grades 17-21

Recyclable materials recovery unit

All the views of the product:

Waste sorting methods vary according to the type of waste and the type of collection. In order to limit as much as possible the t
landfill or incineration, the legislator imposes increasingly ambitious objectives in terms of recycling and recov

Allowing up to **3 pairs of students to work simultaneously** on the system, the **Recyclable Materials Recovery Unit** is
production line which aims to automate the sorting and compacting of recyclable household waste (cans, caps, car

This multidisciplinary system approaches mechanical, electrical, hydraulic and pneumatic skills in a context of environme

A tablet serves as a user interface, and allows access to activities. These activities are presented in the form of dynamic PDF fo
to videos, photos and dynamic

texts

Portofolio Career , Research College Engineering Career Joint Gov Compagny Department

by

portofolio document st pace tshingombe

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Activate Account for Tshingombe Fiston

Inbox

csd.info@csd.gov.za **Unsubscribe**	Fri, Sep 22, 10:12 PM (10 hours ago)

to
me

NOTIFICATION

CENTRAL SUPPLIER
DATABASE
FOR GOVERNMENT

Dear Tshingombe Fiston

Thank you for creating a CSD user account as the first part of your registration.

Please click on the activation link below to activate your account. The link in the email will direct you to the account activation screen.

[Activate Account]

https://secure.csd.gov.za/Account/ActivateAccount?U=6466af5d-eb6f-4b07-bd3d-021a2de411bb&T=1406664b-3084-4c6e-9ebe-9a457ae25079

You can request a new activation link from the login page should the current link have expired.
Navigate to CSD System > Log In > Resend account activation email.

national treasury

Department:
National Treasury
REPUBLIC OF SOUTH AFRICA

FOR MORE INFOI
Central Supplier Da

eMail: CSD@treas

DISCLAIMER: This email and its contents are subject to our email legal notice which can be vie
http://www.treasury.gov.za/Email_Disclaimer.html

If you did not intend to register on the CSD and would like to unsubscribe to CSD system generated emails, click on u
you to dis-associate yourself from a supplier or Organ of State or to delete a supplier master from

t

Welcome, Tshingombe Fiston

Welcome to the Central Supplier Database for the South African government. Here you can maintain your supplier information to ensure accurate, up-to-date, and complete information.

The menu bar gives you access to various functions like links to other websites, reports, and help. The tiles below give you access to the most frequently used features of the system. A brief description of each tile:

- Click on Suppliers Details to add, view, or make changes to supplier information.
- Click on the Registration Summary report to obtain a summary of your supplier reflecting verification and compliance status.
- Click on News to view the latest information, communication, help, and alerts from the CSD team.
- For suppliers, click on My RFQ to view, download RFQ supporting documents, and indicate whether they intend to respond to the RFQ or not.

- Click on My Inbox to view all communication and messages (including RFQs) from CSD.
- Click on My Orders to view order information from National and Provincial Government departments.

SUPPLIER DETAILS

manage suppliers

NEWS (317)

Latest CSD news, communication, help and alerts

REGISTRATION SUMMARY

report

My Inbox (4)

All communication and messages from CSD

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ABOUT SSL CERTIFICATES

My Inbox

Search

Is Read

☐

Communication Type	Subject	To Address	Sent Date	Is Read	View
Email	News Feed Post - News 2023-09-22 10:19:58 PM	tshingombefiston@gmail.com	2023-09-22 22:19:58		
Email	News Feed Post - Release Notes 2023-09-22 10:16:33 PM	tshingombefiston@gmail.com	2023-09-22 22:16:33		
Email	News Feed Post - Release Notes 2023-09-22 10:16:22 PM	tshingombefiston@gmail.com	2023-09-22 22:16:22		
Email	Activate Account for Tshingombe Fiston	tshingombefiston@gmail.com	2023-09-22 22:12:49		

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ABOUT SSL CERTIFICATES

My Inbox - View

Communication Type

Email

Sent Date

2023-09-22 22:19:58

To Address

tshingombefiston@gmail.com

Subject

News Feed Post - News 2023-09-22 10:19:58 PM

Message

NOTIFICATION

CENTRAL SUPPLIER
DATABASE
FOR GOVERNMENT

Dear Tshingombe Fiston

To view more information about the news feed post please use the link below.

https://secure.csd.gov.za//NewsFeed/UserNewsFeedDetails/250

Regards,
CSD Team

national treasury
Department:
National Treasury
REPUBLIC OF SOUTH AFRICA

FOR MORE INFOR
Central Supplier Da

eMail: CSD@treas

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http://www.treasury.gov.za/Email_Disclaimer.html

If you did not intend to register on the CSD and would like to unsubscribe to CSD system generated emails, click on u
you to dis-associate yourself from a supplier or Organ of State or to delete a supplier master from

---

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Supplier Details

Supplier application reference nr	Supplier number	Unique registration referenc	Legal name	Trading name	Identification type	Identification number	Edit	View	Remove		

		e nr									
R0169241870	N/A		Tshingombe	Tshingombe	International Securities Identification Number (ISIN)	520					
R0169242840	N/A		Tshingombe	Tshingombe	Foreign Company Registration Number	520					

PART A
INVITATION TO BID

YOU ARE HEREBY INVITED TO BID FOR REQUIREMENTS OF THE (*NAME OF MUNICIPALITY/ MUNICIPAL ENTITY*)					
BID NUMBER:	R0169241870	CLOSING DATE:	2023/09/2	CLOSING TIME:	11
DESCRIPTION					
THE SUCCESSFUL BIDDER WILL BE REQUIRED TO FILL IN AND SIGN A WRITTEN CONTRACT FORM (MBD7).					

BID RESPONSE DOCUMENTS MAY BE DEPOSITED IN THE BID BOX SITUATED AT *(STREET ADDRESS*

jhb / 103 percy street rockview flet
SUPPLIER INFORMATION

NAME OF BIDDER	Tshingombe tshitadi			
POSTAL ADDRESS	103 percy street			
STREET ADDRESS	103 percy stree jhb			
TELEPHONE NUMBER	CODE		NUMBER	0787675373
CELLPHONE NUMBER	072598946			

FACSIMILE NUMBER	CODE		NUMBER	
E-MAIL ADDRESS	Tshingombefiston@GMAIL.COM			
VAT REGISTRATION NUMBER	N/A			
TAX COMPLIANCE STATUS	TCS PIN:		**OR**	CSD No:

ARE YOU THE ACCREDITED REPRESENTATIVE IN SOUTH AFRICA FOR THE GOODS /SERVICES OFFERED?	Y☐Yes ☐No [IF YES ENCLOSE PROOF]	*ARE YOU A FOREIGN BASED SUPPLIER FOR THE GOODS /SERVICES OFFERED?*	Y☐Yes ☐No [IF YES, ANSWER PART B:3]
TOTAL NUMBER OF ITEMS OFFERED	20	***TOTAL BID PRICE***	**R1000000**
SIGNATURE OF BIDDER	…………………TSHINGO……………	***DATE***	
CAPACITY UNDER WHICH THIS BID IS SIGNED			

BIDDING PROCEDURE ENQUIRIES MAY BE DIRECTED TO:		**TECHNICAL INFORMATION MAY BE DIRECTED TO:**	
DEPARTMENT	EDUCATION	CONTACT PERSON	EDUCATION
CONTACT PERSON	072598946	TELEPHONE NUMBER	072598946
TELEPHONE NUMBER	EDUCATION	FACSIMILE NUMBER	
FACSIMILE NUMBER	072598946	E-MAIL ADDRESS	
E-MAIL ADDRESS	TSHINGOMBEFISTON@GMAIL.COM		
	072598946		

PART B
TERMS AND CONDITIONS FOR BIDDING

1. BID SUBMISSION:

1.1. BIDS MUST BE DELIVERED BY THE STIPULATED TIME TO THE CORRECT ADDRESS. LATE BIDS WILL NOT BE ACCEPTED FOR CONSIDERATION.

1.2. **ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS PROVIDED (NOT TO BE RE-TYPED) OR ONLINE**

1.3. THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT AND THE PREFERENTIAL PROCUREMENT REGULATIONS THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER SPECIAL CONDITIONS OF CONTRACT.

2. TAX COMPLIANCE REQUIREMENTS

2.1 BIDDERS MUST ENSURE COMPLIANCE WITH THEIR TAX OBLIGATIONS.

2.2 BIDDERS ARE REQUIRED TO SUBMIT THEIR UNIQUE PERSONAL IDENTIFICATION NUMBER (PIN) ISSUED BY SARS TO ENABLE THE ORGAN OF STATE TO VIEW THE TAXPAYER'S PROFILE AND TAX STATUS.

2.3 APPLICATION FOR THE TAX COMPLIANCE STATUS (TCS) CERTIFICATE OR PIN MAY ALSO BE MADE VIA E-FILING. IN ORDER TO USE THIS PROVISION, TAXPAYERS WILL NEED TO REGISTER WITH SARS AS E-FILERS THROUGH THE WEBSITE WWW.SARS.GOV.ZA.

2.4 FOREIGN SUPPLIERS MUST COMPLETE THE PRE-AWARD QUESTIONNAIRE IN PART B:3.

2.5 BIDDERS MAY ALSO SUBMIT A PRINTED TCS CERTIFICATE TOGETHER WITH THE BID.

2.6 IN BIDS WHERE CONSORTIA / JOINT VENTURES / SUB-CONTRACTORS ARE INVOLVED, EACH PARTY MUST SUBMIT A SEPARATE TCS CERTIFICATE / PIN / CSD NUMBER.

2.7 WHERE NO TCS IS AVAILABLE BUT THE BIDDER IS REGISTERED ON THE CENTRAL SUPPLIER DATABASE (CSD), A CSD NUMBER MUST BE PROVIDED.

3. QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS

3.1. IS THE ENTITY A RESIDENT OF THE REPUBLIC OF SOUTH AFRICA (RSA)?
y☐ YES ☐ NO

3.2. DOES THE ENTITY HAVE A BRANCH IN THE RSA?
y☐ YES ☐ NO

3.3. DOES THE ENTITY HAVE A PERMANENT ESTABLISHMENT IN THE RSA?
Y☐ YES ☐ NO

3.4. DOES THE ENTITY HAVE ANY SOURCE OF INCOME IN THE RSA?
Y ☐ YES ☐ NO

3.5. IS THE ENTITY LIABLE IN THE RSA FOR ANY FORM OF TAXATION?
Y ☐ YES ☐ NO

IF THE ANSWER IS "NO" TO ALL OF THE ABOVE, THEN IT IS NOT A REQUIREMENT TO REGISTER FOR A TAX COMPLIANCE STATUS SYSTEM PIN CODE FROM THE SOUTH AFRICAN REVENUE SERVICE (SARS) AND IF NOT REGISTER AS PER 2.3 ABOVE.

NB: FAILURE TO PROVIDE ANY OF THE ABOVE PARTICULARS MAY RENDER THE BID INVALID.

NO BIDS WILL BE CONSIDERED FROM PERSONS IN THE SERVICE OF THE STATE.

SIGNATURE OF BIDDER: …………TSHINGOMBE TSHITADI…………………………………

CAPACITY UNDER WHICH THIS BID IS SIGNED: …………STUDENT… LEARNER………………………………

DATE: 2023/09/12……………………………………………

SBD 9

CERTIFICATE OF INDEPENDENT BID DETERMINATION

1 This Standard Bidding Document (SBD) must form part of all bids[1] invited.

2 Section 4 (1) (b) (iii) of the Competition Act No. 89 of 1998, as amended, prohibits an agreement between, or concerted practice by, firms, or a decision by an association of firms, if it is between parties in a horizontal relationship and if it involves collusive bidding (or bid rigging).[2] Collusive bidding is a *pe se* prohibition meaning that it cannot be justified under any grounds.

3 Treasury Regulation 16A9 prescribes that accounting officers and accounting authorities must take all reasonable steps to prevent abuse of the supply chain management system and authorizes accounting officers and accounting authorities to:

a. disregard the bid of any bidder if that bidder, or any of its directors have abused the institution’s supply chain management system and or committed fraud or any other improper conduct in relation to such system.

b. cancel a contract awarded to a supplier of goods and services if the supplier committed any corrupt or fraudulent act during the bidding process or the execution of that contract.

4 This SBD serves as a certificate of declaration that would be used by institutions to ensure that, when bids are considered, reasonable steps are taken to prevent any form of bid-rigging.

5 In order to give effect to the above, the attached Certificate of Bid Determination (SBD 9) must be completed and submitted with the bid:

---

[1] Includes price quotations, advertised competitive bids, limited bids and proposals.

[2] Bid rigging (or collusive bidding) occurs when businesses, that would otherwise be expected to compete, secretly conspire to raise prices or lower the quality of goods and / or services for purchasers who wish to acquire goods and / or services through a bidding process. Bid rigging is, therefore, an agreement between competitors not to compete.

SBD 9

CERTIFICATE OF INDEPENDENT BID DETERMINATION

I, the undersigned, in submitting the accompanying bid:

____________________ R0169241870____

(Bid Number and Description)

in response to the invitation for the bid made by:

____________________TSHINGOMBE TSHITADI / ST PEACE COLLEGE /____

(Name of Institution)

do hereby make the following statements that I certify to be true and complete in every respect:

I certify, on behalf of:_____________TSHINGOMBE TSHITADI______________________________________that:

(Name of Bidder)

1. I have read and I understand the contents of this Certificate;
2. I understand that the accompanying bid will be disqualified if this Certificate is found not to be true and complete in every respect;
3. I am authorized by the bidder to sign this Certificate, and to submit the accompanying bid, on behalf of the bidder;
4. Each person whose signature appears on the accompanying bid has been authorized by the bidder to determine the terms of, and to sign the bid, on behalf of the bidder;
5. For the purposes of this Certificate and the accompanying bid, I understand that the word "competitor" shall include any individual or organization, other than the bidder, whether or not affiliated with the bidder, who:

   (a) has been requested to submit a bid in response to this bid invitation;
   (b) could potentially submit a bid in response to this bid invitation, based on their qualifications, abilities or experience; and
   (c) provides the same goods and services as the bidder and/or is in the same line of business as the bidder

6. The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However communication between partners in a joint venture or consortium[3] will not be construed as collusive bidding.
7. In particular, without limiting the generality of paragraphs 6 above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:
   (a) prices;

(b) geographical area where product or service will be rendered (market allocation)
(c) methods, factors or formulas used to calculate prices;
(d) the intention or decision to submit or not to submit, a bid;
(e) the submission of a bid which does not meet the specifications and conditions of the bid; or
(f) bidding with the intention not to win the bid.

8. In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications and conditions or delivery particulars of the products or services to which this bid invitation relates.
9. The terms of the accompanying bid have not been, and will not be, disclosed by the bidder, directly or indirectly, to any competitor, prior to the date and time of the official bid opening or of the awarding of the contract.

[3] Joint venture or Consortium means an association of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.

10. I am aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to bids and contracts, bids that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No 89 of 1998 and or may be reported to the National Prosecuting Authority (NPA) for criminal investigation and or may be restricted from conducting business with the public sector for a period not exceeding ten (10) years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation.

………TSHINGOMBE ……………………………………….

………………………………..

Signature Date

………LEARNER / STUDENT ………/ 2023 /09/2………………………………..

………………………………..

Position Name of Bidder

Js914w 2

SBD 8

DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES

1 This Standard Bidding Document must form part of all bids invited.

2 It serves as a declaration to be used by institutions in ensuring that when goods and services are being procured, all reasonable steps are taken to combat the abuse of the supply chain management system.

3 The bid of any bidder may be disregarded if that bidder, or any of its directors have-

a. abused the institution's supply chain management system;
b. committed fraud or any other improper conduct in relation to such system; or
c. failed to perform on any previous contract.

4 In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.

Item	Question	Yes	No

4.1	Is the bidder or any of its directors listed on the National Treasury's Database of Restricted Suppliers as companies or persons prohibited from doing business with the public sector? (Companies or persons who are listed on this Database were informed in writing of this restriction by the Accounting Officer/Authority of the institution that imposed the restriction after the *audi alteram partem* rule was applied). **The Database of Restricted Suppliers now resides on the National Treasury's website(www.treasury.gov.za) and can be accessed by clicking on its link at the bottom of the home page.**	Yes Y☐	No ☐
4.1.1	If so, furnish particulars:		
4.2	Is the bidder or any of its directors listed on the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004)? **The Register for Tender Defaulters can be accessed on the National Treasury's website (www.treasury.gov.za) by clicking on its link at the bottom of the home page.**	Yes Y☐	No ☐
4.2.1	If so, furnish particulars:		
4.3	Was the bidder or any of its directors convicted by a court of law (including a court outside of the Republic of South Africa) for fraud or corruption during the past five years?	Yes Y☐	No ☐

4.3.1	If so, furnish particulars:		
4.4	Was any contract between the bidder and any organ of state terminated during the past five years on account of failure to perform on or comply with the contract?	Yes Y☐	No ☐
4.4.1	If so, furnish particulars:		

SBD 8

CERTIFICATION

I, THE UNDERSIGNED (FULL NAME)…TSHINGOMBE TSHITADI…………………………………………….

CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS TRUE AND CORRECT.

I ACCEPT THAT, IN ADDITION TO CANCELLATION OF A CONTRACT, ACTION MAY BE TAKEN AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

TSHINGOMBE………………………………………. **…………………………**

Signature **Date**

……LEARNER TSHINGOMBE / 2023 /09/20………………………………. …………………………

Position **Name of Bidder**

Js365bW

DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES

1 This Standard Bidding Document must form part of all bids invited.

2 It serves as a declaration to be used by institutions in ensuring that when goods and services are being procured, all reasonable steps are taken to combat the abuse of the supply chain management system.

3 The bid of any bidder may be disregarded if that bidder, or any of its directors have-

a. abused the institution's supply chain management system;
b. committed fraud or any other improper conduct in relation to such system; or
c. failed to perform on any previous contract.

4 In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.

Item	**Question**	**Yes**	**No**
4.1	Is the bidder or any of its directors listed on the National Treasury's Database of Restricted Suppliers as companies or persons prohibited from doing business with the public sector? (Companies or persons who are listed on this Database were informed in writing of this restriction by the Accounting Officer/Authority of the institution that imposed the restriction after the *audi alteram partem* rule was applied). **The Database of Restricted Suppliers now resides on the National Treasury's website(www.treasury.gov.za) and can be accessed by clicking on its link at the bottom of the home page.**	Yes Y☐	No ☐

4.1.1	If so, furnish particulars:		
4.2	Is the bidder or any of its directors listed on the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004)? **The Register for Tender Defaulters can be accessed on the National Treasury's website (www.treasury.gov.za) by clicking on its link at the bottom of the home page.**	Yes Y☐	No ☐
4.2.1	If so, furnish particulars:		
4.3	Was the bidder or any of its directors convicted by a court of law (including a court outside of the Republic of South Africa) for fraud or corruption during the past five years?	Yes Y☐	No ☐
4.3.1	If so, furnish particulars:		
4.4	Was any contract between the bidder and any organ of state terminated during the past five years on account of failure to perform on or comply with the contract?	Yes Y☐	No ☐
4.4.1	If so, furnish particulars:		

CERTIFICATION

I, THE UNDERSIGNED (FULL NAME)…TSHINGOMBE TSHITADI……………………………………………….

CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS TRUE AND CORRECT.

I ACCEPT THAT, IN ADDITION TO CANCELLATION OF A CONTRACT, ACTION MAY BE TAKEN AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

TSHINGOMBE………………………………………… **…………………………..**

Signature **Date**

……LEARNER TSHINGOMBE / 2023 /09/20…………………………………
…………………………..

Position **Name of Bidder**

Js365bW

474178762

Registration Workpage

Case Details

Case Number	474178762
Case Requested Date	2023-09-23

Document Details

Document Type	Status	Upload	View
	Waiting for Documentation to be Uploaded		

Registration Workpage

Case Details

Case Number	474178762
Case Requested Date	2023-09-23

Document Details

Document Type	Status	Upload	View
	Submitted		

2023-09-23 2016.01.00 SYSGENOUTLET_ROPP 01/01Page:
tsh TSHITADI

SYSGENOUTLET_R
22933348
2019
: 01/01
SYSGENOUTLET_R SYSGENOUTLET_R
EFILING REGISTRATION
Request for Relevant Material
Contact Detail
Contact Centre Tel: 0800 00 7277
SARS Online: www.sars.gov.za
SARS
Alberton
1528
Details
Always quote this reference
number when contacting SARS
Case No: 474178762
Issue Date: 23/09/2023
tsh TSHITADI
20
percy street
yeohvill
jhb
1030
Enquiries should be addressed to SARS:
Dear tsh TSHITADI
REQUEST FOR RELEVANT MATERIAL
The South African Revenue Services (SARS) would like to thank you for registering for SARS eFiling.
In order for us to finalise your eFiling Registration, we request that you provide the following relevant material:
- Proof of identity
- Proof of residential address
- Bank statement not older than 3 months
- Photo of yourself holding your proof of identity

Please submit relevant material through any of the following channels:
- Via eFiling using the username and password that you provided during the registration process; or
- At your nearest SARS branch.

When submitting your relevant material at a branch, please ensure that you enclose this original letter as it contains a
unique bar-coded reference which links it to your application. SARS only accepts relevant material in A4 format.
The relevant material must be submitted within 21 business days from date of this letter, failing which your
eFiling user registration will be declined.
Should you have any queries please call the SARS Contact Centre on 0800 00 7277. Remember to have your taxpayer
reference number at hand when you call to enable us to assist you promptly.
Sincerely
ISSUED ON BEHALF OF THE COMMISIONER FOR THE SOUTH AFRICAN REVENUE SERVICE

REFERENCE
LIBRRY TABLE …CITY POWER ESKOM
DTC NAZSA

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VACANCY BULLETIN: REF 001
DESIGNATION: ELECTRICIAN (SHIFT WORKER)
GROUP: SERVICE DELIVERY CENTRE
DEPARTMENT: VARIOUS SDCs
REPORTING TO: TEAM LEADER: DISTRIBUTION
TASK GRADE 9 (R350 966)

Appointment Minimum Requirements:

- **Electrical Trade Test Certificate AND**
- **N2 Electrical Engineering AND**
- **Three (3) years' experience in the electrical distribution environment AND**
- **Valid Code C1 Driver's License**
- **Valid Professional Driver's Permit (Must be acquired within 3 months of**

employment)

Primary Purpose:

Perform daily maintenance, repair and installation of electrical systems and equipment. Perform network operating at all voltage levels to ensure a continuous availability of supply. To ensure a reliable and safe electrical system through the application of technical competencies in various tasks requiring a certified level of skills. Contribute towards maintaining a high level of customer satisfaction

Key Responsibilities:

Diagnose equipment malfunctions and repair and adjust using the necessary test equipment, instruments and other tools of the trade. Install, modify and maintain new and existing systems and equipment by working from drawings and sketches and through verbal instructions. Optimally respond to all emergency call outs and complaints and ensure best possible response time. Inspect large electrical systems and ensure all City power requirements are met. Maintain all motors, transformers and electrical controllers attached to large power systems. Perform preventative maintenance on the electrical system i.e. switches, transformers etc.

Carry out scheduled plant and equipment inspection on a regular basis to ensure a safe reliable network with minimum interruptions. Repair and install LV and MV underground and overhead networks and the associated transformers and switchgear. Ensure the right tools and equipment is available and in good condition. Assess requirements for each specific task. Confirm the suitability of equipment for possible refurbishment or re-use.

Ensure customer satisfaction. Ensure compliance with all relevant legislation and SHEQ requirements.

CLOSING DATE: 21 SEPTEMBER 2022

ENQUIRIES: Ext 7343/7687/7099

TO APPLY EMAIL:

recruitment.SDC@citypower.co.za

BULLETIN: 001/2022 REF NO: 001

NB: The City Power application form must be completed and submitted with the application to the relevant email address provided for the specific position. Failure to complete and submit the form will disqualify the applicant for consideration

Note:

- City Power is an Employment Equity Employer; therefore, preference for this position will be given to candidates whose appointment will enhance representation (especially Gender and Disability).
- If you do not hear from us within 2 months of the closing date, you may assume that your application was unsuccessful.
- Applicants must note that further checks will be conducted once they have been shortlisted and that their appointment will be subject to positive outcomes on these checks, which include qualification authentication, criminal records and previous employment.
- City Power reserves the right not to fill the position or to re-advertise it. Where applicable, candidates may be expected to undergo psychometric assessments.
- It is the applicant’s responsibility to have their foreign qualifications evaluated by the South African

Qualifications Authority (SAQA) and to provide the evaluation results.
• Please include copies of your qualifications with your applica
Power Johannesburg
40 Heronmere Road
Reuven
Johannesburg
PO Box 38766
Booysens
2016
www.citypower.co.za
Tel +27(0) 11 490 7000
Fax +27(0) 11 490 7590
CITY POWER
JOHANNESBURG
Bidders are hereby invited for the following RFQ,
further details are available from CITY POWER,
Tender Advice Centre, 40 Heronmere Rd, Rueven, Booysens
Telephone 011 490-7000, Fax 011 490-7765/011 870-3688
CITY POWER JOHANNESBURG (PTY) LTD.
ADVERTISEMENT
REQUEST FOR QUOTATION FOR THE ASSESSMENT 0F EXISTING ELECTRICIANS
TRAD TEST PANELS
REQUEST FOR QUOTATION: Learning Academy
SITE MEETING VENUE: Tender advice centre
SITE MEETING TIME: 10am
DATE OF SITE VISIT: 8 January 2015
RFQ CLOSING DATE: 12 January 2015
RFQ CLOSING TIME: 11h00
CONTACT PERSONS: Zanele Pokwane
RFQ DOCUMENTS WILL BE AVAILABLE ON SITE AND ON THE WEBSITE AS FROM 6 JANUARY 2015
40 HERONMERE ROAD REUVEN, BOOYSENS
SUBMISSIONS: QUOTATION BOX, TENDER ADVICE CENTRE
Please note:-
That we also advertise on our Website:Website
Address: www.citypower.co.za Available Bid's and RFQ'S
SPECIFICATION AND REQUIREMENTS
EVALUATION CRITERIA
MINIMUM THRESHOLD OF 80% ON TECHNICAL FUNCTIONALITY MUST BE ACHIEVED FAILING
WHICH, THE BID WILL NOT BE FURTHER EVALUATION
APPOINTMENT OF A VERIFICATION AGENCY
1st Stage Evaluation: A minimum threshold of 80% must be achieved to proceed to the 2nd Stage Evaluation
Evaluation will be done on a relationship to the weighting on a scale of 0 to 10
Mandatory requirements:
1. Provide proof of National Artisan Moderating Body (NAMB) and/or SETA accreditation
Technical Evaluation: Weight
1. Provide a detailed proposal outlining the latest trade test modular panels for electricians and evaluate existing 40
2.
Provide lead time
Max score points =10 points
Less than 2 days – 10 points
3-5 days = 7 points
More than 5 days = 3 points
30
3.

Provide contactable references of similar work projects done with following:
Company name
Contact person
Contact number
Scope of work
Max score points =10 points
2 and above contactable references = 10 points
2 contactable references = 7 points
1 contactable reference = 3 points
30
Total 100
2nd Stage Evaluation
PRICE 80
B-BBEE 20
Supply Chain Management Delivery Address
Finance Group 40 Heronmere Road
CP Reference Number: Rueven
Date: 06/01/2015 Johannesburg
Contact Person: Zanele Pokwane
Tel: +27 11 490 7083
Fax: +27 11 870 3339
Email: zpokwane@citypower.co.za
Company: ....
Attention: ....
Tel: ....
Fax: ....
You are hereby invited to submit a quotation for the items listed below. Please provide a written quotation
to the above named contact person on or before the closing date indicated below. Only quotations which
contain the information listed below will be accepted. Prices should be shown both exclusive and
inclusive of VAT and fixed and firm. Delivery will be direct to the relevant City Power store.
The scope of work entails supply and delivery of the following computer equipment and
accessories.
Item
No. Description Unit Price Total
1. Assessment of existing electricians trade test panels
SUB TOTAL
VAT
TOTAL
Closing date 12/01/2014 and time 11:00 AM for submission of
quotation:
Vendors must supply written quotations that reflect the following information on the quotation:

- **Quotation Validity Period: ______________________________**
- **Delivery period: ______________________________**
- **Company Name: ______________________________**
- **Company Registration Number: ______________________________**
- **VAT Registration Number: ______________________________**
- **Physical Address: ______________________________**
- **Contact Person: ______________________________**
- **Telephone Number: ______________________________**
- **Fax Number/Email Address: ______________________________**
- **BBB-EE certificate ______________________________**
- **Company Income Tax Number (i.e. SARS No):____________________**
- **Tax Clearance Certificate Attached or consent for City Power to ascertain from SARS**

whether your status is in order:

- **Signed disclaimer (Attached to this RFQ):________________________**

2. Calculation of points for B-BBEE status level of contributor

. B-BBEE Status Level of Contributor	Number of points (80/20 system)
1	20
2	18
3	16
4	12
5	8
6	6
7	4
8	2
Non-compliant contributor	0

CP Reference Number:

Disclaimer: Supplier ( ) hereby warrants that he/she/it has:

(Name of supplier)

1. Read, fully understood and hereby accept City Power's standard quotation Terms & Conditions as published on the official City Power website;

2. Submitted a true and accurate declaration of interests reflecting that the supplier has no immediate family relations and that none of its shareholders, directors, managers or stakeholders are in the employ of City Power or the state currently and that no such relatives, shareholders, directors, managers or stakeholders have been so employed in the previous 12 months;

3. Undertakes to complete a fresh declaration of interests should these circumstances have changed as at date of this quotation. (This declaration is obtainable from the City Power's website/ Commodity Managers and the abovementioned contact person).

Name, Date & Signature of Supplier
(Person responsible for the Quote)
Name:
Signature:
Date

PLEASE SUPPLY THE FOLLOWING DOCUMENTS TO ENABLE US TO EVALUATE YOUR SUBMISSION:

1. VALID TAX CLEARANCE CERTIFICATE
2. VALID BBBEE CERTIFICATE
3. SIGNED DECLERATION OF INTEREST FORM (MBD4)

MBD 4

DECLARATION OF INTEREST

1. No bid will be accepted from persons in the service of the state∗.

2. Any person, having a kinship with persons in the service of the state, including a blood relationship, may make an offer or offers in terms of this invitation to bid. In view of possible allegations of favouritism, should the resulting bid, or part thereof, be awarded to persons connected with or related to persons in service of the state, it is required that the bidder or their authorised representative declare their position in relation to the evaluating/adjudicating authority and/or take an oath declaring his/her interest.

3 In order to give effect to the above, the following questionnaire must be

completed and
submitted with the bid.
3.1 Full Name: ……………………………………………………………………………
3.2 Identity Number: ………………………………………………………………………
3.3 Company Registration Number: ……………………………………………………
3.4 Tax Reference Number: ………………………………………………………………
3.5 VAT Registration Number: ……………………………………………………………
3.6 Are you presently in the service of the state∗ YES / NO
3.6.1 If so, furnish particulars.
…………………………………………………………………….
…………………………………………………………………….
3.7 Have you been in the service of the state for the past YES / NO
twelve months?
…………………………………………………………………….
…………………………………………………………………….
∗ MSCM Regulations: "in the service of the state" means to be –
(a) a member of –
(i) any municipal council;
(ii) any provincial legislature; or
(iii) the national Assembly or the national Council of provinces;
(b) a member of the board of directors of any municipal entity;
(c) an official of any municipality or municipal entity;
(d) an employee of any national or provincial department, national or provincial public entity
or constitutional institution within the meaning of the Public Finance Management Act,
1999 (Act No.1 of 1999);
(e) a member of the accounting authority of any national or provincial public entity; or
(f) an employee of Parliament or a provincial legislature.
3.8 Do you, have any relationship (family, friend, other) with YES / NO
persons in the service of the state and who may be involved
with the evaluation and or adjudication of this bid?
3.8.1 If so, furnish particulars.
…………………………………………………………………….
…………………………………………………………………….
…………………………………………………………………….
3.9 Are you, aware of any relationship (family, friend, other) YES/ NO
between a bidder and any persons in the service of the
state who may be involved with the evaluation and or
adjudication of this bid?
3.9.1 If so, furnish particulars
……………………………………………………………………
……………………………………………………………………
3.10 Are any of the company's directors, managers, principal YES / NO
shareholders or stakeholders in service of the state?
3.10.1 If so, furnish particulars.
…………………………………………………………………….
…………………………………………………………………….
3.11 Are any spouse, child or parent of the company's directors, YES / NO
managers, principal shareholders or stakeholders in service
of the state?
3.11.1 If so, furnish particulars.
…………………………………………………………………….
…………………………………………………………………….
CERTIFICATION
I, THE UNDERSIGNED (NAME) ………………………………………………………………
CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS
CORRECT.

I ACCEPT THAT THE STATE MAY ACT AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

……………………………… …………………………………….
Signature Date
……………………………… ………………………………………………………….
Position Name of Bidder

SPECIFICATION FOR PORTABLE
EARTHING EQUIPMENT
REFERENCE REV
CP_TSSPEC_108 3
PAGE 30 OF 31
TECHNICAL SCHEDULES A AND B
ITEM 9: BRACKET: HORIZONTAL/VERTICAL MOUNTING SAP 349
DEVIATION SCHEDULE

Any deviations offered to this specification shall be listed below with reasons for deviation.

In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.

Item Sub-clause of
CP_TSSPEC_108
Proposed deviation

Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA [“To Be Advice”] will not be accepted

Tender Number: ____
Tenderer’s Authorised Signatory: ____
Name in block letters Signature
Full name of company: ____

SPECIFICATION FOR PORTABLE
EARTHING EQUIPMENT
REFERENCE REV
CP_TSSPEC_108 3
PAGE 31 OF 31
ANNEXURE D – STOCK ITEMS
Material Group: ELECTRICAL ACCESSORIES
Item SAP No. SAP Short Description SAP Long Description
1 3551 PANEL PORTABLE EARTH
EQUIPMENT
PANEL PORTABLE EQUIPMENT FOR EARTHING OR EARTHING AND SHORT CIRCUITING FOR PANELS SUITABLE FOR NOMINAL VOLTAGES, 400V TO 33 KV. SPECIFICATION NO. CP_TSSPEC_108.
2 3561 OVERHEAD LINE PORTABLE
EARTHING GEAR
OVERHEAD LINE PORTABLE EARTH GEAR FOR USE ON LV AND MV LINES, FOUR INTER-PHASE CONDUCTOR, WITH LENGTH OF 1.5 M EACH, AND SINGLE EARTHING CONDUCTOR OF 13 M LONG.
3 3562 HIGH VOLTAGE PORTABLE
EARTHING GEAR
HIGH VOLTAGE EARTH EQUIPMENT, 6MM LONG, FOR USE ON SYSTEM VOLTAGES, 6.6 TO 132 KV FOR EARTHING AND SHORT CIRCUITING THREE PHASE DEVICES TO GROUND. SPECIFICATION CP_TSSPEC_108
4 6636 MAGNEFIX EARTHING KITS
PORTABLE MAGNEFIX EARTHING KITS, TO CONNECT

ISOLATED APPARATUS DIRECTLY TO GROUND FOR SAFE DISCHARGE. CP_TSSPEC_108.
5 3565 INTERSWITCH EARTHING KITS
INTERSWITCH PORTABLE EARTHING KITS TO ISOLATE APPARATUS DIRECTLY TO GROUND TO ENSURE SAFE DISCHARGE OF ELECTRICAL ENERGY AT ALL TIMES.
SPECIFICATION NUMBER: CP_TSSPEC_108
6 3563 EQUIPOTENTIAL EARTHING FOOT PLATE
EQUIPOTENTIAL EARTHING FOOT PLATE 6MM THICK AND 500 X 700 MICRO, WHICH AN OPERATOR STANDS ON, WHILE IN CLOSE PROXIMITY TO LIVE APPARATUS, TO CREATE EQUIPOTENTIAL ZONE.SPECIFICATION NO. CP_TSSPEC_108
7 3564 FIXED EARTHING BALL JOINT
FIXED EARTHING BALL JOINT, TINNED COPPER, 6 MICRO METRE AND 25 MICRO METRE THICKNESS FOR SAFE EARTHING TO THE GROUND. SPECIFICATION: CP_TSSPEC_108
8 6165 INTERSWITCH SWITCHGEAR INSERT SWITCH PLUG
INTERSWITCH SWITCHGEAR INSERT SWITCH PLUG, 6.6-12KV, 450 A. SPECIFICATION NO. CP_TSSPEC_108
9 349 BRACKET: HORIZONTAL / VERTICAL MOUNTING
BRACKET: HORIZONTAL/VERTICAL MOUNTING.
SPECIFICATION: CP_TSSPEC_108

5
ANY ENQUIRIES REGARDING THE BIDDING PROCEDURE MAY BE DIRECTED TO:
Municipality / Municipal Entity: City Power
Department: Supply Chain Management
Contact Person: Ndivhuwo Mamphaga
Tel: 011 490 7634
Fax: 011 870 3717
E-mail: nmamphaga@citypower.co.za
ANY ENQUIRIES REGARDING TECHNICAL INFORMATION MAY BE DIRECTED TO:
Contact Person: Ndivhuwo Mamphaga
Tel: 011 490 7634
Fax: 011 870 3717
E-mail: nmamphaga@citypower.co.za
REPORT FRAUD AND CORRUPTION TO EITHER OF THE FOLLOWING SERVICES;
TOLL FREE – 0800 002 587
FAX – 0800 007 788
E-mail: anticorruption@tip-offs

F1.1 The employer is City Power Johannesburg (SOC) Ltd
F1.2 The tender documents issued by the employer comprise:
Part 1: Tendering procedure
1.1 Invitation to Bid (MBD 1)
1.2 Application for Tax Clearance Certificate (MBD 2)
1.3 Tender data

1.4 CIDB Standard conditions of tender (updated July 2015)
Part 2: Pricing data
2.1 Pricing instruction
2.2 Non-Firm Prices Form (MBD 3.2)
2.3 Price Schedule
Part 3: Agreements and contract data
3.1 Form of acceptance
3.2 Contract data
3.3 Formal contract (MBD 7.1)
Part 4: Returnable documents
.1 Returnable documents required for evaluation purpose

- **Municipal Rates and Taxes (Not in arrears for more than 90 days)**
- **SHERQ Regulations**
- **Invitation to Bid (MDB 1)**
- **Declaration of Interest Form (MBD 4)**
- **Declaration for Procurement above R10 000 000 (MBD 5)**
- **Preference Claim Form (MBD 6.1)**
- **Declaration Certificate for Local Content (MDB 6.2)**
- **Annexure C, D & E (Please refer to DTI website for further clarity)**
- **Declaration for Purchase of Goods (MBD 7.1)**
- **Declaration of Bidder’s past SCM practices (MBD 8)**
- **Certificate of Independent Bid Determination (MBD 9)**
- **B-BBEE Certificate or Sworn Affidavit**
- **Valid Tax Clearance Certificate or SARS Pin**
- **Financial Statements for the past three years**
- **Central Supplier Database (CSD) Registration Report**
- **Additional soft copy of the Bid Document must be submitted on Memory Stick**

4.2 Other documents required for evaluation purpose
4.3 Documents that will be incorporated in the contract
Part 5: Scope of work
5.1 Evaluation Criteria
5.2 Bill of Quantities
5.3 Specifications
. NON-FIRM PRICES SUBJECT TO ESCALATION
1. IN CASES OF PERIOD CONTRACTS, NON FIRM PRICES WILL BE ADJUSTED (LOADED) WITH THE
ASSESSED CONTRACT PRICE ADJUSTMENTS IMPLICIT IN NON FIRM PRICES WHEN CALCULATING THE
COMPARATIVE PRICES
2. IN THIS CATEGORY PRICE ESCALATIONS WILL ONLY BE CONSIDERED IN TERMS OF THE FOLLOWING
FORMULA:□ □
VPt
oR
tR
D
oR
tR
D
oR
tR
D
oR
tR
DPtVPa □□
□
□
□
□
□ □□□□□ 4

4
4
3
3
3
2
2
2
1
1
11
Where:
Pa = The new escalated price to be calculated.
(1-V) Pt = 85% of the original bid price. Note that Pt must always be the original bid price
and not an escalated price.
D1, D2.. = Each factor of the bid price eg. labour, transport, clothing, footwear, etc. The total of
the various factors D1,D2 etc. must add up to 100%.
R1t, R2t...... = Index figure obtained from new index (depends on the number of factors used).
R1o, R2o = Index figure at time of bidding.
VPt = 15% of the original bid price. This portion of the bid price remains firm i.e. it is not
subject to any price escalations.
3. The following index/indices must be used to calculate your bid price:
Index.......... Dated.......... Index.......... Dated.......... Index.......... Dated..........
Index.......... Dated.......... Index.......... Dated.......... Index.......... Dated..........
4. FURNISH A BREAKDOWN OF YOUR PRICE IN TERMS OF ABOVE-MEN 2

33 SHER
FILE ....
.. 20
34 HOURS OF
WORK.. 20
SECTION 37(1)
AGREEMENT ....
21

3

SHER SPECIFICATION FOR LUTZ CABLE PROJECTS

1 INTRODUCTION

1.1 Project and scope of work details

It is the intention of these projects to construct:

1. Double circuit, 200MVA firm, 88kV cable supply between the Eskom's Dalkeith Substation
and City Power's new Lutz Substation consisting of 6 x single core, 2500mm² Aluminium
XLPE cables.
2. Ramp for access into Dalkeith Substation with ducts to protect the cables entering the
substation.

The above work will consist of civil and electrical construction works at ground level and also at
heights. Work will, in some cases, take place in close proximity of existing electrical installations of
voltages up to 88kV.

1.2 Project accountabilities and responsibilities

i) The principal contractor is responsible for adequately informing and training his/her employees
and subcontractors of all relevant information of the City Power-issued work information, SHER

specifications, and the principal contractor’s SHER plan.

ii) Employees are responsible for their own health and safety and that of their co-workers in their area. They must be made aware of their responsibilities during induction and awareness sessions, some of which are:

- **familiarising themselves with their workplaces and health and safety procedures;**
- **working in a manner that does not endanger them or cause harm to others;**
- **ensure that work area is kept tidy;**
- **reporting all incidents/accidents and near misses;**
- **protecting fellow workers from injury;**
- **reporting unsafe acts and unsafe conditions;**
- **reporting any situation that may become dangerous; and**
- **Carrying out lawful orders and obeying health and safety rules.**
- **Be aware of pedestrians, traffic and external interferences.**

iii) Every person responsible under Section 16.1 and Section 16.2 must have undergone general City Power SHER induction training before work commences under their auspices, and every employee of the principal contractor, subcontractor, and employer’s staff involved in the project must undergo site induction that will be provided by the principle contractor before entry onto site, commencement of the contracted work, and for specific tasks. Principal contractor and subcontractor employees shall have documented verification of completed induction training.

Please note that casual workers are also employees that will be treated under all the legislative requirements, standards, procedures and rules of permanent employees.

iv) It must be highlighted to all employees that anyone who becomes aware of any person disregarding a safety notice, instruction, or regulation shall immediately report this to the person concerned. If the person persists, stop the person from working, and report the matter to the City Power project coordinator, clerk of works, consultant or the principal contractor supervisor immediately.

v) No person shall damage, alter, remove, render ineffective, or interfere with anything that has been provided for the protection of the site or for the health and safety of persons.

4

vi) No person under the influence of alcohol, drugs, or medication (in a state of intoxication) or any other condition that may render him/her incapable of controlling himself/herself or other persons under his/her charge shall be allowed to enter the site.

vii) All safety and warning signs must be obeyed at all times.

viii) Entering or leaving the site may only be done via the official designated walkways; do not take short cuts. Follow designated walkways to and from your workplace. Walk, do not run, and be alert to motor vehicle traffic and mobile equipment.

ix) All employees must adhere to the SHER and other site-specific rules.

x) If any of the principal contractor’s employees or his/her subcontractor employees have

transgressed any of the requirements of the SHER specification, SHER plan, or site rules, then
the employee will be removed from site and his/her site access revoked. The principal
contractor must follow a process of disciplinary action, which shall include retraining/inducting
the employee (at the cost of the principal contractor), and provide proof thereof to the City
Power site/project manager. On the satisfaction of the City Power site/project manager, the
employee will be allowed back on site.

2 LEGAL AGREEMENT

In terms of section 37(2) of the OHS Act, it shall be required of every contractor to sign an agreement
with City Power.
REFER TO ANNEXURE 1 - 37(2) agreement.

3 CLIENT AND CONTRACTOR ORGANISATIONAL STRUCTURES

Client organisational structure for this project – To be submitted
Contractor - To be submitted

4 APPOINTMENTS

- OHS Act: section 16(1) Employer
- OHS Act: section 16(2) Employer
- OHS Act: GMR 2(1) Supervisor of Machinery
- OHS Act: GMR 2(7) Supervisor of Machinery Assistant
- OHS Act: section 17 Health and Safety Representative
- OHS Act: GSR 3 First-aiders
- OHS Act: DMR 17(2) Goods Hoist Inspector
- OHS Act: GAR 9(2) Incident/Accident Investigator
- OHS Act: EMR 9 Portable Electrical Equipment Inspector
- OHS Act: CR 4(1)(c) Appointment of the Contractor by the City Power Client (to be done when contract is awarded)
- OHS Act: CR 5(3)(b) Subcontractor Appointment by the Contractor (if appointing subcontractors)
- OHS Act: CR 6(1) Construction Supervisor (appointed by the contractor's OHS Act section 16.2 assignee)
- OHS Act: CR 6(2) Assistant Construction Supervisor (appointed by the contractor 16.2 appointee)
- OHS Act: CR 6(6) Construction Health and Safety Practitioner
- OHS Act: CR 7(1) Person to Compile Risk Assessments

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- OHS Act: CR 8(1)(a) Competent Person to Compile Fall Protection Plan
- OHS Act: CR 11(1) Person to Supervise Excavation Work
- OHS Act: CR 15(1) Suspended Platform Supervisor
- OHS Act: CR 17(1) Material Hoist Inspector
- OHS Act: CR 18(1) Batch Plant Supervisor
- OHS Act: CR 21(1)(j) Construction Vehicle and Mobile Plant Inspector
- OHS Act: CR 22(e) Temporary Electrical Installation Controller
- OHS Act: CR 26(a) Stacking and Storage Supervisor
- OHS Act: CR 27(h) Fire fighting Equipment Inspector
- City Power requirement – Emergency Planning Co-coordinator
- City Power requirement – Fire official
- Environmental officer – each contractor shall appoint and provide a full-time suitably qualified and competent environmental officer (EO) for the duration of the work, with a minimum

average ratio of one EO per 500 employees if there are ROD conditions to comply with.

- **High Voltage Regulations Appointment – Responsible and authorised persons to undergo training and be appointed.**

5 COMPETENCE AND TRAINING

- **To use a Compactor – On job training**
- **Drilling with Augur – Drilling course**
- **Health and Safety Rep Training**
- **First Aid Level 2**
- **Crane Operator Training**
- **RCAT**
- **Hazard identification and Risk assessment**
- **High voltage regulations**
- **FAS Training**
- **Fire fighting course**
- **Evacuation Procedure**
- **Site induction**

The contractor shall ensure that all his/her employees, agents, and contractors have undergone the project safety induction programme prior to commencing work on site.

Appropriate time must be set aside for training (induction and other) of all employees.

Prior to induction, all employees must undergo a pre-employment medical examination and must be found fit for duty. A copy of the certificate of fitness must be presented for permanent record at the site offices for permanent record.

All employees and visitors on site shall have proof of induction training.

6 SUBCONTRACTOR MANAGEMENT

6.1 Contractor accountabilities for their subcontractors

- **When subcontractors are appointed, the contractor shall inform the client/agent and obtain his/her approval.**
- **When contractors appoint subcontractors, the contractors would then have the same role and responsibility in relation to the subcontractors as the client/agent has in relation to the principal contractor.**
- **Contractors are directly accountable for the actions of their subcontractors. The contractor will also be responsible for initiating any remedial action (recovery plan) that may be necessary to ensure that the contractor complies with all requirements.**

6

- **The principal contractor shall provide any subcontractor who is making a bid or is appointed to perform construction work with the relevant sections of the documented SHER specification, who would, in turn, provide the client/agent with a SHER plan for approval.**
- **The contractor shall carry out audits on the subcontractor at least monthly to ensure that his/her SHER plan is being implemented and maintained.**
- **City Power may conduct audits on subcontractors. Any non-conformances/ findings/observations found in these audits shall be raised and discussed with the relevant contractor (with whom the subcontractor is contracted).**
- **The client/agent shall stop any contractor and/or the contractor shall stop any subcontractor from executing construction work that poses a threat to the safety and health of**

persons or the environment or non-compliance with the approved SHER plan.

- **Contractors shall have a work coordination process in place that will prevent any conflict occurring between individual site activities and subcontractor activities.**
- **The work coordination process provides the management arrangements for reviewing, controlling, and monitoring each subcontractor and his/her individual work packages while he/SHER is present and working on the project site.**
- **The work coordination process should identify the overall SHER working requirements that a contractor and subcontractor will need to provide to the project to enable assessment of their procedure and controls. The work coordination process will allow the work to proceed without risk to the health and safety of the contractor's personnel, other contractors operating in the vicinity, visitors, delivery personnel, and the client's personnel present on the site.**

NB: NAME OF SUBCONTRACTOR AND PROOF OF COMPETENCY TO BE PROVIDED

6.2 Subcontractor SHER plan

The subcontractor shall prepare a SHER plan based on the SHER specifications that shall be provided by the principal contractor. The SHER Plan shall be in line with SHER Specifications provided by the client.

The SHER plan must detail specific plans and programmes for implementing the health, safety, and environmental requirements of the contract. The SHER plan may be a collection of actual documents and manuals and should include, where applicable, the following as a minimum:

- **The principal contractor(s)' and their subcontractor(s)' SHER policies**
- **Indication of competent supervision on site (CVs to be included)**
- **Duties and safety responsibilities of all appointed persons on the project**
- **Selection, placement, and training procedures, including induction and ongoing training, in "basic safe work" and occupational health and safety training for newly hired or promoted supervisors**
- **Occupational health and safety communications and meetings, including daily safe task instructions and project safety meetings**
- **Assessment of subcontractors, including requirements for safety plans**
- **Safety awareness promotions**
- **Nomination of personnel to carry out safety inspections. The task may be shared with other duties and provided within the resources of individual gangs and may be rotated.**
- **Contractor senior management involvement with the company's staff in consultative processes and daily management safety walkabouts**
- **Rules and regulations, including safety procedures that the contractor has in place for recurring work activities**
- **Control of dangerous and hazardous substances**
- **System of hazard identification and risk control, such as risk assessments, daily safe task instructions, and communication**
- **Design control (if applicable)**

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- Audits to ensure compliance with safety plans
- Daily site safety inspections and audits. The auditing role may be shared with other duties or provided within the resources of individual groups. The role may be rotated.
- Inspection of plant, tools, and equipment prior to introduction to site and regularly thereafter
- Accident incident reporting, recording, investigation, and analysis, which ensure that corrective action is taken and that this action is communicated to report initiators
- Medical and first-aid arrangements
- Evacuation and emergency planning
- Rehabilitation procedures that encourage an early return to work
- Substance abuse programme
- Record keeping, including details of what is kept and for how long
- Detailed financial allocation for health and safety
- Monitoring mechanisms
- Site meeting arrangements
- Audit arrangements
- Maintenance arrangements of machinery and equipment
- Designer interaction arrangements
- Workers’ welfare facilities
- Arrangements for induction and toolbox talks
- Training arrangements
- Letter of good standing with a compensation insurer
- Performance review and improvements on the project
- Past health and safety performance statistics of the company (at least two years)
- Applicable standards, legislation, and guidelines to be adopted
- Details of the interface between the client/agent and the contractor
- Specific procedures, methods, and work instructions to be applied
- Personal protective equipment provision and rules
- Transport safety
- Occupational health and hygiene arrangements, including, but not limited to respiratory and hearing protection, alcohol and drug policies, health assessments, smoking, and first aid
- Management of subcontractors – the client/agent requires the same from subcontractors as it does from contractors
- Training and competence regarding SHER
- Legal appointments
- Medical examinations for all employees
- Working hours – compliance with Labour Relations/Basic Conditions of Employment Act

7 FORUMS FOR SHER COMMUNICATION

The principal contractor(s) and their subcontractor(s) will have to provide a communication strategy outlining how they intend to communicate SHER issues to their staff, the media they will employ, and how they will measure the effectiveness of their SHER communication.

Matters that are discussed include, but are not limited to the following:

- Accident/safety incidents
- Accident investigations (including near misses) and close-out of recommendations
- Audit findings and close-out
- Hazardous materials/substances
- Work procedures
- Protective clothing/equipment
- Housekeeping

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- Work permits
- Non-conformances
- Emergency preparedness
- Traffic control
- Medicals
- Training
- Forthcoming high-hazard activities
- General SHER issues
- Matters arising from contractors’ SHER meetings
- Toolbox Talks
- Incident Case studies

NB: MINUTES OF ALL COMMUNICATION TO BE KEPT ON FILE

8 LEGAL COMPLIANCE

It is the duty of the contractor to ensure that he is familiar with the required SHER legislation.

Non-conformances

The client/agent is entitled to stop work and issue non-conformance reports whenever health, safety, or environmental violations are observed for both contractors and/or their subcontractors.

9 CONTRACTOR’S SITE FACILITIES

The contractor must outline how the site facilities should be managed. This should include, but not be limited to the following:

- Temporary facility layout plan

Not included in this project

- Dining room facilities

Not relevant for this project

- Change rooms

Provide Hut on site

- Ablution facilities

Sanitation facilities shall be provided for Men and women

- Site Sheds, offices, and amenities

A suitable site meeting office must be provided.

- Lay-down and storage

Poles must be properly stacked, supported and stored in a manner that will not endanger people.

Other equipment must be stored/stacked properly and demarcated around each type of equipment

- Site access

Access control register at the gate of the site/store

- Temporary site services

Physical barricading for all open trenches and holes that are left open without someone in attendance.

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Such barricading shall be at least 1 meter high and made visible through signs and warning lights if it is during poor visibility

 Installation and maintenance of temporary construction electrical supply, lighting, and equipment

As required

 Adjacent land uses/surrounding property exposures

Proper barricading and signage of construction taking place.

 Boundary and access control/public liability exposures (remember: the employer is also responsible for the OH&S of non-employees affected by his/her work

activities)

Proper access control – Everyone on site shall have their names on the workers register

Proper barricading and signage of construction taking place.

- **Health risks arising from neighbouring as well as own activities and from the environment, for example, threats by dogs, bees, snakes, lightning, allergies, etc.**

Dogs in the area.

Dust resulting from Digging, Drilling and excavation

Noise resulting from Digging, Drilling and excavation

Illegal connections – Electrical contact

10 PROJECT AND SITE RULES

The following basic safety rules should be taken into consideration:

- **Approved hard hats and safety glasses.**
- **Steel-toe/safety-toe work boots.**
- **Additional eye protection shall be worn when job-specific hazards dictate especially when drilling, digging and excavating with machinery.**
- **Hearing protection shall be worn when entering all operations areas and areas posted as hearing protection areas or when using equipment that produces noise levels in excess of 85 decibels especially when drilling, digging and excavating with machinery**
- **Respiratory protection shall be worn when performing tasks that dictate the need for such equipment especially when drilling, digging and excavating with machinery**
- **Good housekeeping practices shall be continually maintained and work areas left in a clean and safe condition at the end of each shift.**
- **Smoking policy: smoking is permitted in designated areas only.**
- **Risk assessment will be performed and discussed every morning with all staff present at the job.**
- **Only trained, certified personnel shall operate aerial lifts, forklifts, motorised equipment, drilling machines and excavating equipment.**
- **Ladders must be properly constructed and kept in good repair. Ladders shall be the proper length and type for the task. All ladders shall be identified, registered and inspected monthly.**
- **A fall protection plan shall be developed with the minimum requirements that will include inter alia:**
- **Training**
- **Equipment u 14**
- **The training should have been done according to the code of practice by a provider registered with the Department of Labour.**
- **Before using any lifting machines or tackle, the operator should inspect it/them.**
- **All lifting machines shall be examined and subjected to a performance test by an accredited person/company at intervals not exceeding 12 months.**
- **All lifting tackle should be examined by an accredited person/company at intervals not exceeding three months.**
- **Refer to the requirements of the Driven Machinery Regulation 18 and Construction Regulation 17 and 20 of the OHS Act.**
- **All lifting tackle should be recorded in a register.**
- **All hooks shall be fitted with a safety latch/catch.**
- **A management control system should be implemented to ensure that only an**

operator who is competent can draw lifting machines and forklifts.

- **All lifting tackle should be conspicuously and clearly marked with identification particulars and the maximum mass load for which it is designed.**
- **No person shall be moved or supported by means of a lifting machine, unless such a machine is fitted with a cradle approved by an inspector.**
- **A risk assessment should be conducted prior to starting with the task.**
- **Account should be taken of wind forces.**
- **Lifting machines are erected taking into account a safe distance from excavations.**
- **When working in close proximity to power lines, the contractor must apply for a permit. Refer to City Power Plant Safety Regulations and/or Operating Regulations for High-voltage Systems and Electrical Machinery Regulation 15 of the OHS Act.**
- **Account should be taken of the bearing capacity of the ground.**

Principal contractors and their employees shall keep out from under suspended loads, including excavators, and between a load and a solid object where they might be crushed if the load should swing or fall. They shall not pass or work under the boom or any crane or excavator, Suspended loads that are lifted must be guided with ropes and no person is allowed to guide any load by hand.

19 WORKING AT HEIGHT

CONTRACTOR TO PROVIDE A FALL PROTECTION PLAN

The fall protection plan shall include a task-/job-specific risk assessment and requirements relating to the following:

- **Training programme for employees working from a fall risk position**
- **Appointments and authorisations**
- **The procedure addressing the inspection, testing, and maintenance of all fall protection equipment**
- **The processes for evaluation of the employees’ medical fitness necessary to work in a fall risk position and the records thereof (medical surveillance programme)**
- **Equipment use and specification**
- **Fall prevention, fall arrest, and fall rescue**
- **Method statements or safe work procedures/task analysis/work instruction**

20 EXCAVATIONS, TRENCHES, AND FLOOR OPENINGS

Requirements in Construction Regulation 11 of the OHS Act shall apply.

- **Digging, excavation, or driving a peg, pile, or spike into the ground by the contractor may not commence without written authorisation from the client’s/agent’s representative.**
- **Prior to commencing work on any excavation or trench, utility owners shall be contacted and advised of the proposed work and to determine the location of all underground installations,**

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that is, sewer, telephone, water, fuel, electric, etc. Overhead hazards shall be assessed and dealt with prior to commencement of work.

- **Adequate precautions shall be taken by the contractor to prevent slumping of excavations, as well as to prevent rocks and loose material falling onto workers.**
- **All excavations done by the contractor are to be clearly demarcated and barricaded to**

prevent accidental access.

- Only solid barricading will be used in areas where a fall hazard is present. Solid barricading and/or hole covers shall be provided around all holes or openings to prevent any person being injured as a result of a fall. Danger tape may only be used as a pre-warning to make the solid barricading more visible and to prevent persons from coming close to the danger area.
- Barricading must be placed as close as reasonably possible to the excavation.
- If an excavation or trench endangers the stability of buildings or walls, shoring, bracing, or underpinning will be provided. Excavations and trenches that are adjacent to backfilled excavations or trenches, or that are subject to vibrations from railroad traffic, road traffic, blasting, or the operation of machinery (for example, shovels, cranes, trucks), must be secured by a support system, shield system, or other protective system.
- Where it is impracticable to provide fixed guard railing, effective removable barriers shall be provided at all unguarded openings in guard railings or floors, and these shall be maintained in position at all times until the hazard no longer applies.
- Warning signs and flashing warning lights at night shall be displayed in suitable positions to warn any persons approaching the area of the location and extent of any excavation.
- No material to be within 3 m of the excavation edges.
- All excavations must be on register and inspected daily before work commences and after inclement weather by the contractor’s appointed competent person, declared safe, and his/her findings noted in the said register. Client/agent to review the said register on a predetermined frequency not exceeding seven (7) days.
- While work is being performed in an excavation, there shall be a supervisor at all times.
- Every twelve meters, there shall be an escape ladder in all excavations.
- Requirements in Construction Regulation 11 of the OHS Act shall apply as well.
- No work shall commence in an excavation, unless the excavation has been declared safe by the competent person.

21 EXPLOSIVES

Requirements of the Explosives Regulations of the OHS Act shall be adhered to.

A copy of the written permission from the Chief Inspector of the Department of Labour shall be obtained before use of any explosive material – refer to the requirements in Explosives Regulation 13 of the OHS Act.

Requirements for the transporting and storage of explosives to be in accordance with Explosives Regulation 13.4 of the OSH Act and SANS 100228 “Code of Practice for the Identification and Classification of Dangerous Substances and Goods” (published by the South African Bureau of Standards).

Should blasting be necessary during the construction phase, the necessary authorisation must be secured from the relevant local municipality. Adjacent landowners must be notified prior to the blasting activities on site.

The construction operations may necessitate that ground and rock be blasted. Prior to a blast, a siren will have to be sounded. Warning flags will have to be displayed at the entrance to the area of the blast, and guards will be placed at strategic points.

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Should the contractor be required to carry out blasting operations, he/she is to fully acquaint himself/herself with, and adhere to, the blasting procedures and legislation. Every blast must be cleared with the appropriate client’s/agent’s representative before charges are placed.

Only a licensed operator is allowed to blast.

22 PERMIT TO WORK

Contractors must adhere to the approved City Power permit-to-work system to control identified high-risk activities

If the type of work requires that contractors must be trained, competence-assessed, and authorised in writing to perform the duties of an authorised or responsible person as contemplated in the applicable City Power regulations, for example:

- Operating Regulations for High-voltage Systems;
- Plant Safety Regulations;
- confined space work.

The client’s/agent’s representative is to provide more details on the permit-to-work system for the specific work to be conducted by the principal contractor.

23 WORKING NEAR PUBLIC ROADS

23.1 PUBLIC SAFETY RISK PLAN TO BE PROVIDED

Necessary precautionary and preventive safety measures shall be taken where persons are required to work on or near roadways. Consideration shall be given to the wearing of high-visibility vests, and protection by red cones or flags during daylight and use of red or amber flashing lamps at night.

Work areas must be adequately barricaded so as to prevent unauthorised access.

Road traffic warning signs shall be placed well ahead of the work area.

24 WORK STOPPAGE

The conditions that lead to work stoppages are based on:

- management of change – this is when there are changes to the work environment (for example, climatic changes) and construction work (for example, modifications to the design), in any phase of the construction project, and/or amendments with regard to City Power rules and regulations and/or legislative amendments;
- unsafe acts/behaviours; and
- Unsafe conditions.
- Injury or fatality

The process to be followed is:

- The relevant activity must be stopped.

The City Power site/project manager and/or principal contractor and his/her subcontractors shall immediately remove the workforce from the work area and correct the health and safety deficiencies by allowing only the people in the area who are competent to make the area safe.

The principal contractor and his/her subcontractors shall ensure that no other work is being performed during this time. Should the estimated time from the outset to make the area safe where life-threatening/imminent danger situations exist, then the area shall be suitably barricaded and signposted with the wording “Unsafe Area – Authorised Access Only”.

The City Power site/project manager shall review the affected parts/sections of the SHER specification with the purpose of providing sufficient SHER information to the principal contractor.

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The principal contractor shall then revise the relevant sections in the SHER plan to accommodate the changes.

The City Power site/project manager must ensure that the revised provisions in the SHER plan are adequate and must approve them before the work activity is commenced.

Before the workforce is allowed back in the area, the principal contractor and his/her subcontractors shall ensure that:

- the area is re-inspected by the contractor safety practitioner and supervisor and note corrective actions taken; and
- declare the area safe for work by signing off on the “work stoppage” notice issued by the City Power site/project manager.

Refer to the requirements of Construction Regulation 4(e) of the OHS Act.

25 HAZARD AND RISK MANAGEMENT

The aim of this section is to do the following:

- Highlight the construction site SHER risks and hazards (reference must be made to the EIA (Environmental Impact Assessment), EMP (Environmental Management Plan), ROD (Record of Decision), and the client’s/agent’s baseline hazard identification).
- Request the contractor and his/her subcontractors to identify hazardous and potentially hazardous work operations. The contractor needs to demonstrate that the site hazards and the contractor’s activity risks and the mitigating measure have been considered in his/her risk assessments.
- There must be method statements or written safe work procedures for all the contractor activities.
- Emerging risks and hazards must be managed during construction work.
- The Management of Bees should be included in the EMP and Impact and Aspect register.

Activity-based risk assessments must be conducted by an appointed and competent person of the contractor.

Preliminary hazard identification shall be conducted by the contractor prior to work beginning on site.

25.1 SAFE WORK PROCEDURES AND PRACTICES

There must be written safe work procedures for all activities. Risk assessments should refer to the safe work procedures.

The safe working procedure should identify:

- The level of supervision required for the task
- The training and qualifications required by the workers to perform the task

- the supervisor for the task or job and the employees who will undertake the task;
- the tasks that are to be undertaken that pose risks;
- the equipment and substances that are used in these tasks;
- the control measures that have been built into these tasks;
- the personal protective equipment to be worn; and
- actions to be undertaken to address safety issues that may arise while undertaking the task.

25.2 HIGH-RISK ACTIVITIES

When the principal contractor and/or his/her subcontractors are working in an area where a high health and safety hazard exists, the principal contractor shall take additional precautions.

Dust Mask – Dust mask shall be provided for each person

Noise – Baseline and periodic audiometric testing for each person

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Working on heights – FAS shall be used

26 SHER PLAN

The SHER plan must detail specific plans and programmes for implementing the health, safety, and environmental requirements of the contract. The SHER plan may be a collection of documents and manuals and should include, where applicable, the following as a minimum:

- SHER policies
- Applicable standards, legislation, and guidelines to be adopted
- Commitments to government approvals and project licences
- SHER objectives
- Allocation of responsibilities and authorities
- Details of the interface between the client/agent and the contractor
- Specific procedures, methods, and work instructions to be applied
- Risk assessments
- Safety awareness promotions
- Personal protective equipment provision and rules
- Rehabilitation procedures to encourage an early return to work
- Transport safety
- Occupational health and hygiene arrangements, including, but not limited to respiratory and hearing protection, alcohol and drug policies, health assessments, smoking, and first aid
- Monitoring of employee exposure to occupational stressors as identified in the risk assessments
- Safety meeting schedules
- Management of subcontractors – client/agent requires the same from subcontractors as it does from contractors
- Training and competence regarding SHER
- Incident reporting, investigation, and recording
- Audit, review, and management feedback
- Letter of good standing – Workmen’s Commissioner
- Legal appointments
- Medical examinations for all employees
- SHER personnel presence on site
- Crisis and emergency response arrangements
- Maintenance, inspection, and testing of construction vehicles, machinery, equipment, and substances
- Working hours – compliance with Labour Relations/Basic Conditions of Employment Act
- The SHER plan shall be submitted to the client/agent for review and approval and, once

accepted, shall not be amended without prior consultation and acceptance by the client/agent.

27 EMERGENCY PREPAREDNESS

The contractor(s) shall develop a site-specific emergency preparedness plan to take into consideration an adequate level of preparedness, response, and recovery to prevent or minimise the impact of an emergency situation pertaining to human life and property.

The emergency preparedness plan must address all the geographic locations where project work scope is undertaken and where project personnel are sent.

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28 FIRE RISK MANAGEMENT

Contractors must develop a fire safety procedure for the specific construction site prior to commencing work. The procedure must take into consideration the size of the site, the type of work being done (for example, cutting, welding, grinding, etc.), and the amount of combustible materials. It must be developed in accordance with the hot work permit of the City Power Plant Safety Regulations, City Power fire risk management requirements, and all other applicable regulations. All workers entering and working on the construction site need to be trained in fire safety and any duties they are required to perform. Pre-existing fire systems in buildings shall be maintained during construction whenever possible. Any changes must be approved by the client/agent.

29 ENVIRONMENTAL MANAGEMENT

Contractors shall ensure duty of care towards the environment by:

- **Reference to the project environmental management plan (EMP).**
- **ensuring compliance with all environmental legislation (zero legal contraventions);**
- **ensuring compliance with all City Power environmental policies, procedures, guidelines, etc.;**
- **ensuring landowner satisfaction through timeous consultation with landowners; and**
- **demonstrating environmental competence of staff through appropriate training where their activities could impact on the environment.**
- **A waste management plan shall be established in order to provide guidelines for the proper storage, handling, and disposal of waste generated by the project during the course of construction.**

30 AUDITING

The contractor’s SHER plan shall be audited in order to ensure compliance with the requirements of the City Power SHER specifications.

City Power reserves the right to conduct unannounced audits on contractors.

31 INCIDENT MANAGEMENT

The contractor shall have an incident reporting system that is compatible with City Power’s requirements and all applicable legislation. Any incident or near miss involving the clients, contractors, or third-party’s personnel, property, plant, or equipment shall be reported as soon as reasonably practicable, but not later than 24 hours, to the client’s/agent’s representative, irrespective

of whether injury to personnel or damage to property or equipment resulted.

The contractor shall ensure compliance with City Power incident management processes for reporting and investigation of incidents.

The contractor shall investigate the causes of all incidents and shall within two working days, provide the client/agent with the results of the investigation and recommendations on how to prevent a recurrence.

The client/agent shall have a right to designate a representative to participate in the investigation at the client's/agent's sole discretion.

The principal contractor shall keep on site/at the workplace a record of all accidents and incidents reported in the form of the OHS Act Annexure 1 investigation form as referenced in the OHS Act (Incident Investigation Report).

The principal contractor shall provide SHER-related statistics to the client at the end of each month.

City Power reserves the right to conduct an independent investigation in any incident.

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32 OMISSIONS FROM THIS SHER SPECIFICATION

By drawing up this SHER specification, City Power has endeavoured to address the most critical aspects relating to SHER issues in order to assist the contractor in adequately providing for the health and safety of employees on site.

Should City Power not have addressed all SHER aspects pertaining to the work that is tendered for, the contractor needs to include them in the SHER plan and inform City Power of such issues when submitting the tender.

33 SHER FILE

The contractor shall also record in the SHER file:

- **information about removal or dismantling of installed plant and equipment;**
- **hands-on information about equipment needing cleaning and maintenance, for future purposes;**
- **nature, location, and markings of services; and**
- **as-built drawings.**

The file must be kept on site and must be available on request for audit and inspection purposes.

At the end of the contractor's contract, the SHER file shall be handed over to the client/agent

34 HOURS OF WORK

All work conducted on site shall fall within the legal requirements in accordance with the Basic Conditions of Employment Act. The client/agent is to be notified of any exemptions granted in terms of section 50 of the Basic Conditions of Employment Act.

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Section 37(1) of the OHSA states that whenever a employee does or omits to do any act which it would be an offence in terms of this Act for the employer of such employee or a user to do or omit to do, then, unless it is proved:

That the employee was acting without the permission of the employer or that the act was not within the scope of authority of the employee or that all reasonable steps were

taken by the employer to prevent the act in question. The Agreement below provides for the above section that the parties agree to ensure compliance to the requirements of the act. SECTION 37(1) AGREEMENT WRITTEN AGREEMENT ON OCCUPATIONAL HEALTH AND SAFETY In accordance with the provisions of section 37(2) of the Occupational Health and Safety Act 85 of 1993 AS ENTERED INTO AND BETWEEN .... (City Power Division/ Business Unit) (hereinafter referred to as “the Client”) AND .... (hereinafter referred to as “the Contractor”) 18 Working on heights – FAS shall be used 26 SHER PLAN The SHER plan must detail specific plans and programmes for implementing the health, safety, and environmental requirements of the contract. The SHER plan may be a collection of documents and manuals and should include, where applicable, the following as a minimum: - SHER policies - Applicable standards, legislation, and guidelines to be adopted - Commitments to government approvals and project licences - SHER objectives - Allocation of responsibilities and authorities - Details of the interface between the client/agent and the contractor - Specific procedures, methods, and work instructions to be applied - Risk assessments - Safety awareness promotions - Personal protective equipment provision and rules - Rehabilitation procedures to encourage an early return to work - Transport safety - Occupational health and hygiene arrangements, including, but not limited to respiratory and hearing protection, alcohol and drug policies, health assessments, smoking, and first aid - Monitoring of employee exposure to occupational stressors as identified in the risk assessments - Safety meeting schedules - Management of subcontractors – client/agent requires the same from subcontractors as it does from contractors - Training and competence regarding SHER - Incident reporting, investigation, and recording - Audit, review, and management feedback - Letter of good standing – Workmen’s Commissioner - Legal appointments - Medical examinations for all employees - SHER personnel presence on site - Crisis and emergency response arrangements - Maintenance, inspection, and testing of construction vehicles, machinery, equipment, and substances - Working hours – compliance with Labour Relations/Basic Conditions of		

Employment Act

- The SHER plan shall be submitted to the client/agent for review and approval and, once accepted, shall not be amended without prior consultation and acceptance by the client/agent.

27 EMERGENCY PREPAREDNESS

The contractor(s) shall develop a site-specific emergency preparedness plan to take into consideration an adequate level of preparedness, response, and recovery to prevent or minimise the impact of an emergency situation pertaining to human life and property.

The emergency preparedness plan must address all the geographic locations where project work scope is undertaken and where project personnel are sent.

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28 FIRE RISK MANAGEMENT

Contractors must develop a fire safety procedure for the specific construction site prior to commencing work. The procedure must take into consideration the size of the site, the type of work being done (for example, cutting, welding, grinding, etc.), and the amount of combustible materials. It must be developed in accordance with the hot work permit of the City Power Plant Safety Regulations, City Power fire risk management requirements, and all other applicable regulations. All workers entering and working on the construction site need to be trained in fire safety and any duties they are required to perform. Pre-existing fire systems in buildings shall be maintained during construction whenever possible. Any changes must be approved by the client/agent.

29 ENVIRONMENTAL MANAGEMENT

Contractors shall ensure duty of care towards the environment by:

- Reference to the project environmental management plan (EMP).
- ensuring compliance with all environmental legislation (zero legal contraventions);
- ensuring compliance with all City Power environmental policies, procedures, guidelines, etc.;
- ensuring landowner satisfaction through timeous consultation with landowners; and
- demonstrating environmental competence of staff through appropriate training where their activities could impact on the environment.
- A waste management plan shall be established in order to provide guidelines for the proper storage, handling, and disposal of waste generated by the project during the course of construction.

30 AUDITING

The contractor’s SHER plan shall be audited in order to ensure compliance with the requirements of the City Power SHER specifications.

City Power reserves the right to conduct unannounced audits on contractors.

31 INCIDENT MANAGEMENT

The contractor shall have an incident reporting system that is compatible with City Power’s requirements and all applicable legislation. Any incident or near miss involving the clients, contractors, or third-party’s personnel, property, plant, or equipment shall be reported as soon as reasonably practicable, but not later than 24 hours, to the client’s/agent’s representative, irrespective of whether injury to personnel or damage to property or equipment resulted.

The contractor shall ensure compliance with City Power incident management processes for reporting and investigation of incidents.

The contractor shall investigate the causes of all incidents and shall within two working days, provide the client/agent with the results of the investigation and recommendations on how to prevent a recurrence.

The client/agent shall have a right to designate a representative to participate in the investigation at the client’s/agent’s sole discretion.

The principal contractor shall keep on site/at the workplace a record of all accidents and incidents reported in the form of the OHS Act Annexure 1 investigation form as referenced in the OHS Act (Incident Investigation Report).

The principal contractor shall provide SHER-related statistics to the client at the end of each month.

City Power reserves the right to conduct an independent investigation in any incident.

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32 OMISSIONS FROM THIS SHER SPECIFICATION

By drawing up this SHER specification, City Power has endeavoured to address the most critical aspects relating to SHER issues in order to assist the contractor in adequately providing for the health and safety of employees on site.

Should City Power not have addressed all SHER aspects pertaining to the work that is tendered for, the contractor needs to include them in the SHER plan and inform City Power of such issues when submitting the tender.

33 SHER FILE

The contractor shall also record in the SHER file:

- information about removal or dismantling of installed plant and equipment;
- hands-on information about equipment needing cleaning and maintenance, for future purposes;
- nature, location, and markings of services; and
- as-built drawings.

The file must be kept on site and must be available on request for audit and inspection purposes.

At the end of the contractor’s contract, the SHER file shall be handed over to the client/agent

34 HOURS OF WORK

All work conducted on site shall fall within the legal requirements in accordance with the Basic Conditions of Employment Act. The client/agent is to be notified of any exemptions granted in terms of section 50 of the Basic Conditions of Employment Act.

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Section 37(1) of the OHSA states that whenever a employee does or omits to do any act which it would be an offence in terms of this Act for the employer of such employee or a user to do or omit to do, then, unless it is proved:

That the employee was acting without the permission of the employer or that the act was not within the scope of authority of the employee or that all reasonable steps were taken by the employer to prevent the act in question.

The Agreement below provides for the above section that the parties agree to ensure compliance to the requirements of the act.

SECTION 37(1) AGREEMENT
WRITTEN AGREEMENT ON
OCCUPATIONAL HEALTH AND SAFETY
In accordance with the provisions of section 37(2)
of the Occupational Health and Safety Act 85 of 1993
AS ENTERED INTO AND BETWEEN
....
(City Power Division/ Business Unit)
(hereinafter referred to as “the Client”)
AND
....
(hereinafter referred to as “the Contractor”)

a world class African city
TENDER DOCUMENT
Dalkeith - Lutz 132kV Cable
VOLUME 2
Technical Specifications
Tender No. Dalkeith – Lutz 132kV Cable

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1. General Information

1.1 Definitions and Terminology

“Employer” for the purposes of this document shall mean City Power Johannesburg.

“Engineer” for the purposes of this document shall mean City Power’s appointed representative.

“Site” for the purposes of this document shall mean the cable route length and any area affected by the cable works.

All definitions and terminology in the applicable standards and specifications will apply.

1.2 Location of the Works

The Dalkeith - Lutz site is situated in the north western area of Roodepoort.

1.3 Overview of the Works

It is the intention of this project to construct a double circuit, 200MVA firm, at 88kV, cable supply between the Eskom’s Dalkeith Substation and City Power’s new Lutz Substation consisting of 6 x single core, 2500mm² Aluminium XLPE cable system. The approximate route length is 4800 meters.

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The principal features of the Scope of Works do not limit the responsibility of the Contractor. He shall perform all work and furnish all labour, equipment and material to ensure the satisfactory operation of the cable link.

Material and devices that are normally part of the supplied equipment and are essential for the proper operation of all equipment or are necessary for the proper functioning of the whole installation shall be supplied even if not explicitly called for in these Specifications.

The Employer will be responsible for:
a. Operating of the electrical network,
b. Issuing of permits in existing- and energised substations.
c. Cable route servitudes.

The Contractor will provide the following:

a. Any detail designs required to ensure that the cable rating meets the specified values for the Work indicated below.
b. Final route survey and finalisation of exact cable drum lengths. Off-cuts will be limited to a maximum of 2 meter lengths.
c. All plant, material, transport and labour required for the construction of the works.
d. Commissioning of the works, ready for operation and service.
e. Updated as-built drawings as per specification.
f. Operating and Maintenance Manuals and Training as specified.
g. All wayleave, road closure approvals for the installation.
h. Ensure all wayleave approvals are current.
i. All test equipment to test and commission the installation.
j. All temporary site camps and services.
k. 24 Hour security along the cable route and site camp.
l. A suitable site if soil must be stored temporarily.
1.4 Extent of the Works:
a. Prepare and supply all detail design drawings for cable, earthing, terminations, joints, joint pits, optic fibre works and termination structures.
b. Bulk earthworks for the cable trenching, backfilling and rehabilitation of the construction route.
c. Supply and constructing of road crossings making use of directional drilling as required.
d. Supply and installation of fencing alterations, additional fencing and gates at Dalkeith substation.
e. The supply and construction of an access ramp at the Dalkeith substation.
f. Design, supply and installation of all concrete footings at Dalkeith substation for equipment support structures. (Optional – may be a take-out item).
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tail technical information of the equipment required is specified in the attached Technical Data Sheets. These sheets form part of the technical returnable documents and must be completed in full.
Technical Returnable Documents: See Volume 3.
Drawings: See Volume 4.
Wherever the term standard is used in this specification, this shall mean the latest City Power/ international / national standard in the following order of priority:

- **City Power CP_TSSPEC_XXX.**
- **SANS (South African National Standards).**
- **NRS (National Rationalisation of Specifications).**
- **IEC (International Electro-technical Commission).**
- **IEEE (Institute of Electrical and Electronic Engineers Inc.).**
- **BS (British Standard).**

In case of any contradiction between any of the specifications, technical datasheets and drawings; the order of precedence shall be:

- **General and Technical Specification.**
- **City Power Specifications.**
- **Technical Datasheets.**
- **Drawings.**
- **Other Standard Specifications in the absence of a City Power specification.**

Wherever the term goods, material and/or equipment is used it shall mean new, unused and of the most recent or current models, incorporating all recent improvements in design and materials, tested in accordance with the required standard.

All sections of the works must comply with the relevant specifications as referred to in this document. In case of any conflict in requirements it shall be referred in a timely manner, in writing, to the Engineer whose ruling shall be final. A list of the specifications and standards are attached as an Annexure.

2.5 Interchangeability

All items of similar equipment supplied under this Contract must be identical and completely interchangeable.
All auxiliary equipment must also be identical.

2.6 Quality Requirements

It is required that the Contractor has a Quality Management System based on or similar to ISO 9001:2000 in place. Please also take note of the cable and accessories review process as indicated in Annexure 7.

2.7 Material

The Contractor will be responsible to supply, deliver and install all the equipment and material required to perform the work, even though it is not specifically referred to in this specification.

If the Tenderer is in doubt regarding any material or labour item that is not included in the Schedules of Quantities, he must list, cost and price it under “other” in the Schedules of Quantities. Failure to do so will imply the cost thereof is provided for elsewhere.

All materials and equipment supplied must be from the suppliers as submitted in the Detailed Technical Specifications. Any change in supplier shall be presented to the Engineer for approval.

All material shall be new and from fresh stock. Should other material be required it should first be presented to the Engineer for approval prior to use.

All material will be handled in the correct and safe manner as not to damage the material. All damaged material will be for the Contractor’s count.

All material and equipment installed must have an established and proven support structure within South Africa to ensure quick repairs as and when required for maintenance purposes after completion of the project. The Tenderer must provide proof of the support facilities. The employer reserves the right to negotiate material and equipment offered before contract award.

2.8 Access to Sites

Access routes to the site shall at all times be kept serviceable, or alternatives shall be provided. These include road entrances that may have to be kept closed overnight. The cables will be installed, in most cases, inside the boundaries of private properties. Property owners must have unrestricted access to their properties.

2.9 Site Security

Theft of material can pose a major problem and it is essential that secure stores be erected with fulltime site security. Security must be provided on the cable route as well. All necessary security and safety precautions must be taken where the cables run inside private property boundaries. This may include, but not limited to, temporary fencing and or barricading.

2.10 Sheds and Storerooms

The Contractor shall provide, erect and maintain proper sheds for the storage and protection of materials and Plant, which may be fabricated or brought into the Site. Limited space will be made available at the Lutz substation.

All huts and buildings erected by the Contractor on the Site and not forming part of the Works shall from the time of their erection until the completion of the Works be the property of the Employer and the Contractor shall not demolish or remove any buildings or part of any buildings without the written permission of the Engineer. The site facilities and site may not be used for staff accommodation.

On completion of the Works they shall become the property of the Contractor who shall, if so ordered, remove them entirely with all drains and water mains and restore the surface of the land to its original condition or other reasonable condition, in either case, to the satisfaction of the Engineer.

2.11 Facilities at Base Camp

The Contractor shall provide and maintain all the necessary facilities, including sanitation, along the cable route and base camp site for use by the project staff.

The Contractor shall provide and maintain a site office for progress meetings with the Engineer and Employer and for the safe keeping of all contract related documentation.

The Contractor shall, during the Contract period, maintain permanent access to the Employer's/Engineer's office and this access is to be suitable for vehicular traffic under all weather conditions.

A limited three phase 400V/80A capacity temporary LV AC supply may be available at the substation/base camp site.

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The Contractor must:

- **ensure that the construction supply complies fully with all the required regulations.**
- **apply for the temporary building supply.**
- **provide for all costs associated with the supply and the consumption of electricity for the duration of the project.**
- **maintain the connection for the duration of the project.**

2.12 Site Data

The Tender shall be deemed to have been based on such data on climatic, hydrological and general conditions on the Site and for the operation of the Works as the Employer or the Engineer has made available to the Contractor for the purpose of the Tender, as well as supplementary data obtained independently by the Contractor. The Contractor shall be responsible for his own interpretation of such data and the Employer accepts no responsibility for the sufficiency or accuracy of such data.

2.13 Extension of Time Due To Abnormally Inclement Weather

No extension of time for completion will be granted on count of normal inclement weather, but extension of time in terms of clause 30 of the General Conditions of Contract, arising from abnormal rainfall or wet conditions shall be calculated in accordance with the formula given below, separately for each calendar month or part thereof. Such extension of time shall be calculated for the whole period for completion of the Contract, including

any extension thereof.
V = Extension of time in calendar days in respect of the Calendar month under consideration.
Nw = Actual number of days during the calendar month on which a rainfall of Y mm or more has
been recorded.
Rw = Actual rainfall in mm for the calendar month under consideration.
Nn = Average number of days, as derived from existing rainfall records on which a rainfall of Y mm
or more has been recorded for the calendar month.
Rn = Average rainfall in mm for the calendar months as derived from the rainfall records.
The total extension of time shall be the algebraic sum of the monthly totals for the period under consideration,
but if the grand total is negative the time for completion shall not be reduced due to below normal rainfall.
Extensions of time for part of a month shall be calculated using pro-rata values of Nn and Rn.
The factor (Nw - Nn) shall be considered to represent a fait allowance for variations from the average number
of days during which rainfall exceeds Y mm. The factor shall be considered to represent a fair
allowance for variations from the average in the number of days during which rainfall. Extensions of time for
part of a month shall be calculated using pro-rate values of Nn and Rn.
The formula does not take into count flood damage, which could cause further or concurrent delays and this
should be treated separately as far as extension of time is concerned.
"Y" shall be taken as 10 m Tender No. Dalkeith – Lutz 132kV Cable
Contractor’s and Sub-Contractor’s drawings shall not relieve the Contractor from his responsibility for errors
or omissions which may exist, even though work is done in accordance with such approved drawings. Where
such errors or omissions are discovered later, they shall be made good by the Contractor out of his expenses
irrespective of any approval of the Engineer.
The Contractor shall submit for approval a list of drawings/drawing schedule, indicating each kind of drawing
per site and the estimated first submission date.
This list of drawings shall be updated whenever necessary until completion of the work.
All drawings and design data prepared or furnished by the Contractor shall be marked with the title of the work
and shall be transmitted to the Engineer. The transmittal of drawings and design data shall be accompanied
by a Document Transmittal Sheet (DTS) giving the titles and numbers thereof. The forms of the drawing list
and DTS are subject to approval of the Engineer.
Modified drawings shall bear a revision letter and revision date, and the nature of the modification shall be
clearly stated, no matter if the drawing was already approved, approved except as noted, revised or not
approved.
All drawings shall have a title block incorporating a serial number, issue and revision dates and numbers, and
the system subject. The title block shall be to the approval of the Engineer and in accordance with the
Employers’ requirements. The title shall include the name, the logo and the address of the Employer and the
Engineer as per samples available from the Engineer.

All drawings shall be plotted in and shall show the scales of the metric system, and all descriptive wording shall be in the English language.

The construction works shall be carried out only as per approved drawings with all the Engineer’s comments incorporated. These drawings shall be clearly and tidily updated with red ink incorporating all changes carried out at site during the erection and testing works. The changed or cancelled items shall not be deleted by eraser or liquid corrector, but crossed only, in order to keep visible the cancelled part. Two sets of these “Marked Up” drawings shall be handed over before the energising of any section of works (one set to the Employer and one set to the Engineer).

Final drawings and technical data sheets of the work as completed, the so-called “as-built” documents, shall be prepared by the Contractor based on the Marked up drawings approved by the Engineer. These documents properly bound in files with separation between the engineering disciplines, i.e. civil lay-out, structural layout (structures, hardware assemblies etc) shall be in sufficient detail to enable the Employer to maintain, dismantle, reassemble, and adjust all parts of the work. Contents of the “as built” documentation and the file arrangement shall be subject to approval by the Engineer.

2.23.1 Documents to be submitted

As far as periods given for submission of documents for information, and of documents for approval are concerned, the times stipulated there are tentative only, thus the Contractor shall submit his own detailed schedule in compliance with his completion periods as per the Contract. The respective modified lists shall be submitted for approval within one month at the latest after Contract signature.

2.23.2 Documents for Information

The following documents shall be submitted by the Contractor for information within the following periods, calculated from the Contract Commencement Date.

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Description Months

Any particulars required further to documents submitted 1

Proof that the project has been registered with the Department of Labour in terms of the requirements of the Construction Regulations

1 month prior to construction

Proof of competency certificates and appointments of site staff as required by the Construction Regulations

1 month prior to construction

Final Lists of Standards for all equipment, plus the relevant Standards deviating from those Specified.

1

Cash flow schedule 1

Factory – and internal working drawings 3

Up-to-date:

a. Drawings lists

b. Project progress report

c. Manufacturing progress information

d. Shipment schedules
every month
every month
every 2 weeks
every month
Pro-Forma Operation Manuals and Maintenance books prior to Commissioning
Final "As-built" drawings (hardcopy and in dwg, dxf format) 2 months after TOC
Final Operation Manuals and Maintenance books 2 months after TOC

2.23.3 Documents for Approval

The following documents shall be submitted by the Contractor for approval within the following periods, calculated from the date of Contract Commencement Date.

Description Months
Detailed programme, charts and progress reports 1
Contractor's standard SHERQ Manual with particulars applicable to the Contract 1
Form of cash flow schedule 1
Civil engineering loadings 1
Detailed dimensional drawings of all equipment 1
Project Quality Plan 2
Risk assessment and Safety Plan in terms of the Construction Regulations. After site establishment but before commencement of construction
Cable calculations 2
Manufacturing progress information and schedule for acceptance tests 2
Shipment schedule 2
Factory Inspection schedule 3
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Description Months
Complete technical details and detailed drawings of all equipment 3
Operation manuals and maintenance books 1 month prior to erection
Schedule of factory and site test procedures 2 months prior to commissioning
Schematic Diagrams 6
Final earthing measurements and calculations prior to commissioning
Site test reports working sets prior to completion tests
Completion test records prior to TOC
As Built drawings- copies of drawings marked up in red colour prior to completion tests

NOTE: In the event of the Contractor failing to submit the mentioned design data and drawings to the satisfaction of the Engineer, the concerned part of the work at site may be interrupted to the full and sole responsibility of the Contractor and penalties may be applied as per the contract.

All documents, correspondence, etc. shall be distributed in accordance with a Contract Procedure to be agreed with the Engineer but based upon the following tentative schedule:

DOCUMENT ENGINEER's
OFFICE
SITE

OFFICE
Drawings for Approval 2 0
Approved Drawings 2 1
Drawings for information 1 1
Schedules, Specifications and other documents 1 1
As Built Drawings – Marked-up 1 1
As Built Drawings Final (Prints) 2 0
As Built Drawings – Final, dwg files 2 -
Codes and Standards (whenever applicable) 1 -
Preliminary Manuals for approval 1 -
Approved Final Manuals 1 -
Acceptance Test Procedure for approval 2 1
Approved Acceptance Test Procedure 1 1
Test Reports – Working Sets - 1
Test Reports – Final Sets 1 1
Manufacture Progress information 1 -
Insurance Certificates 1 1
Receiving cum Damage Reports 1 1
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DOCUMENT ENGINEER's
OFFICE
SITE
OFFICE
Weekly Site Labour Register - 1
Safety Inspections and Minutes 1 1
Monthly Progress Reports 1 1
Master Program 1 1
Correspondence – General 1 -
Correspondence – Site Matters 1 1
Payment Invoices 1 -
DOCUMENT QTY FORMAT ADDRESS
FINAL
SUBMISSION
FOR APPROVAL
As-Built Drawings 1 Hard Copy Reuven Project Co-ordinator
All Test Certificates 1 Hard Copy Reuven Project Co-ordinator
Operation Manuals and
Maintenance books 1 Hard Copy Reuven Project Co-ordinator
Equipment Schedules 1 Hard Copy Reuven Project Co-ordinator
Differential Protection Fibre Test
Report 1 Hard Copy Reuven Project Co-ordinator
Quality Certificates 1 Hard Copy Reuven Project Co-ordinator
2.23.4 Documents for submission after completion of project
The following deliverables shall be distributed in accordance with the following tentative schedule:
DOCUMENT QTY FORMAT ADDRESS
FINAL
HANDOVER
DOCUMENTS
Project Close-out report 3 Hard Copy Reuven Planning Engineer
Project Close-out report 1 Electronic Copy Reuven Planning Engineer

As-Built Drawings 3 Hard Copy Reuven Planning
Engineer
As-Built Drawings 1 Electronic Copy
(AutoCAD format)
Reuven Planning
Engineer
As-Built Drawings 3 Hard Copy Reuven Telecom
Engineer
As-Built Drawings 1 Electronic Copy
(AutoCAD format)
Reuven Telecom
Engineer
All Test Certificates 3 Hard Copy Reuven Planning
Engineer
All Test Certificates 1 Electronic Copy Reuven Planning
Engineer
Operation Manuals and
Maintenance books 3 Hard Copy Reuven Planning
Engineer

Operation Manuals and
Maintenance books 1 Electronic Copy Reuven Planning
Engineer
Equipment Schedules 3 Hard Copy Reuven Planning
Engineer
Equipment Schedules 1 Electronic Copy Reuven Planning
Engineer
Differential Protection Fibre Test
Report 3 Hard Copy Reuven Telecom
Engineer
Differential Protection Fibre Test
Report 1 Electronic Copy Reuven Telecom
Engineer
Quality Certificates 3 Hard Copy Reuven Planning
Engineer
Quality Certificates 1 Electronic Copy Reuven Planning
Engineer
Handover Certification 3 Hard Copy Reuven Planning
Engineer
Handover Certification 1 Electronic Copy Reuven Planning
Engineer

2.24 Equipment Inspection and Testing

The Engineer reserves the right to inspect any equipment at the manufacturer's works at any stage during manufacture. The Contractor shall notify the Engineer of any routine or type testing at the factory. Fourteen (14) days’ notice of such testing is required. Equipment shall not be despatched from the factory until, final factory testing has been witnessed by the Engineer, or until his authority has been given for despatch.

The direct reimbursable costs for FAT’s and inspections outside Gauteng, such as travel expenses, accommodation and per diem, shall be borne by the Contractor. Allowance must be made for two City Power representatives.

Any equipment rejected due to valid technical reasons or failed tests shall be subject to re-testing and/or inspection. The expenses incurred under these circumstances shall be borne by the Contractor. Repetition of tests or inspections will not prejudice the right of the Employer to impose liquidated damages for delay in completion provided elsewhere in the Contract.

2.25 Test Certificates

Copies of all test certificates shall be submitted to the Engineer and shall be included in the substation manual.

The Contractor must provide certificates of compliance for all the applicable electrical installations.

Copies of all commissioning tests shall also be included in the substation manuals.

2.26 Commissioning and Testing

A commissioning test will only be successful once the specified values are attained, irrespective of the number of readings required in the process.

2.27 Manuals and Books

The Contractor shall prepare and submit Operation and Maintenance (O & M) manuals. All instruction sheets shall be properly filed, containing all information description of equipment, diagrams, etc. necessary to enable the Employer to properly operate and maintain the whole of the work including all possible operating procedures.

The various instructions shall be easily intelligible for the operating and maintenance personnel, explaining in various situations what is to be done and why.

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The preliminary sets of the Operation and Maintenance Manuals shall be submitted prior to issuing the provisional handing over certificate by the Engineer. The final submission of the O & M Manuals shall incorporate all comments from the Employer/Engineer to the preliminary manuals.

2.28 Safety

The Contractor must comply with all the requirements of the OHS ACT, Regulations 85 of 1993, any statutory regulations that may be required in terms of this project and the special SHER requirements as per attached annexure 5.

The Contractor shall take all the necessary precautions to ensure the safety of personnel when working on or near live electrical equipment. The Contractor shall notify the Engineer in advance of all switching or disconnecting of HV equipment.

Suitable barriers and warning signs must be erected in areas where personnel or members of the public can come in close contact with “Live” equipment. Safety Clearances - Substations

The upper edge of any grounded part of any insulator or bushing, inside a fenced off substation yard, shall be a minimum 2.4m above ground level.

The following table shall be used in all designs.

It may be necessary to have less clearance in certain existing yards, due to the existing layout and space restrictions. These cases shall be discussed with the Engineer before a final design is made.

Voltages Minimum Electrical
Clearance in mm
Minimum Working
Clearance in mm
System

Nominal Voltage	System Highest Voltage	Phase-to-Earth (mm)	Phase-to-Phase (mm)	Vertical (mm)	Horizontal (mm)
132kV	145kV	1200	1650	3700	2300

2.29 Insulation Coordination

Standardised levels for the highest system voltages U m related to the rated voltages are defined in IEC60071-1&2. According to these levels the test voltages for the insulation of high voltage equipment are defined.

Rated Voltage Un (kVrms)	132
Highest System Voltage Um (kVrms)	145
Power Frequency Withstand Voltage 50Hz, 1min. Upf (kVrms)	230
Lightning Impulse Withstand Voltage 1.2/50μs. Uli (kVrms)	550

2.30 Training

The Contractor shall, during construction, allow for “On site” training of skilled personnel to be appointed by the Employer, in order to improve knowledge and transfer of skills. The Contractor shall also allow for a full course of formal training of at least six City Power employees in all aspects of the project material and equipment.

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Operational training, during commissioning and testing, shall involve the Employer’s operational and supervisory staff. Training of protection, operational and technical personnel shall also be carried out during factory acceptance testing, as described in this specification. The Employer will nominate the personnel who will be required to attend the training during FATs, SATs and site commissioning.

2.30.1 Safety Training

- Prior to commencing work on site, the Contractor shall ensure that all staff on Site have completed a training course during which they are instructed of the hazards on Site and the actions required of them. No staff shall be permitted to work on site unless they have completed the training.
- A safety meeting shall be held at least once a week, which all staff shall attend,

to inform them of any existing or new hazard or health risk present on site.

- The proceedings of the safety meetings shall be recorded in writing and each staff member shall be copied with the minutes of the meeting. A declaration by each staff member that they understand the hazards and risks and the mitigating actions required of them shall be attached to these minutes. The minutes shall be kept on file on Site at all times.
- Every day, before commencing work, the Contractor shall hold a short discussion during which one staff member explains to the rest of the work team his/her understanding of the inherent hazards and risks. A different staff member shall be chosen each day so that all staff are required to demonstrate that they have a clear understanding of the hazards on site.

2.30.2 Installation, Operation and Maintenance Training

- Training shall be provided at City Power to enable the Employer’s staff to install and maintain the equipment offered. Two hardware and maintenance training sessions with a maximum of ten personnel per session shall be provided.
- The Hardware and Maintenance Training course for the HV cable and ancillaries shall include, but not be limited to, the following:

- Theory of operation.
- Installation.
- Preventative maintenance.
- Testing, troubleshooting and configuration.
- Repairs.
- Maintenance manual review.
- Practical demonstration.

2.31 Labour

The Contractor shall make his own arrangements for the engagement of all labour and for their payment, housing, feeding and transport.

2.32 Signage and Labels

2.32.1 Fence Signage

The appropriate signage, as per City Power’s requirements and international standards, shall be installed on the fence and the access gates.

The signs shall include danger notices, access warnings and limitations, operational prohibitions and first aid information.

All signs and notices shall be in English and the wording shall be submitted for approval, before manufacture commences.

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Danger and prohibition signage shall have red letters and written on a white background and information signage shall be white with black lettering.

The signage shall be manufactured from corrosive resistant materials and/or sheet metal, finished in a baked enamel coating. Holes shall be provided at each corner of the sign, for fixing purposes. The dimensions of the signs shall be as required by the wording thereon.

Stick-on lettering will not be accepted.

Letters for danger notices shall be minimum 50mm in height.

A standard safety and first aid notice and information shall be fixed to the access gate(s) and shall provide full safety and first aid instructions to be followed in case of an accident. The instructions shall be accompanied by illustrations to assist in the execution thereof.

2.32.2 Equipment Labels

Each piece of equipment, indoor and outdoor, shall be provided with an identification label, clearly indicating the actual designation of the equipment.

The signage shall be manufactured from UV and corrosive resistant materials and/or sheet metal, finished in a baked enamel coating. Holes shall be provided at each corner of the sign, for fixing purposes. The dimensions of the signs shall be as required by the wording thereon.

Stick-on lettering will not be accepted.

3. Design Information

3.1 Lutz Substation Electrical Equipment Layout

The general arrangement of the electrical equipment for Lutz substation is indicated in Fig 1. The two inner feeder bays will accommodate the overhead line feeders to Peter road and Christiaan de Wet road substations and the incomers on the outer sides will accommodate the two cable incomers from Dalkeith substation. The use of the cables simplifies the line turn-ins as there will be no power line crossings close to the substation.

Figure 1 : Lutz Substation general arrangement

3.2 Dalkeith Substation Electrical Equipment Layout

At Dalkeith substation Eskom allowed for two overhead line bays. This will now be converted to cable feeders.

The existing bays have overhead gantries that will be converted to cable termination feeder bays as indicated on Fig 2.

Figure 2 : Dalkeith Substation general Tender No. Dalkeith – Lutz 132kV Cable

Pulling eyes shall be provided on both ends of a cable drum length. The pulling eye shall be securely connected to both the cable conductor and the sheath to avoid elongation of the sheath during installation.

The cable shall be installed using a winch and care shall be taken not to exceed the maximum permissible pulling force specified by the manufacturer.

Where conditions are particularly difficult, the continuous bond pulling method shall be used.

The bending radius during cable installation shall at all times be larger than the minimum specified by the manufacturer.

Cable rollers shall be used as far as possible to run out cables. Rollers shall be spaced so that the length of cable in the trench will be totally suspended during the laying operation and sufficiently close to prevent undue sagging and the cable from touching the ground. Rollers shall also be placed in the trench in such a manner that they will not readily capsize.

Cable rollers shall have no sharp projecting parts liable to damage the cables.

Where cables have to be drawn around corners, well-lubricated skid plates shall be used. The skid plates shall be securely fixed between rollers and shall constantly be examined during cable laying operations.

Where cables have to be drawn through sleeves or ducts special care shall be taken to avoid damage to the outer sheath. A suitable cable sock shall be used and particular care shall be exercised to avoid abrasion, elongation or distortion of any kind.

It will be assumed that the price or rates contained in the tender includes for the installation of cables in sleeves or below existing or newly installed services. The Engineer shall be informed timeously of the intention to carry out all cable laying operations to allow an inspection of the works if so required.

The Engineer shall be informed timeously of the intention to carry out all cable laying operations to allow an inspection of the works if so required.

Cables shall be neatly arranged in flat formation and the engineer or his representative shall inspect the installation before backfilling commences.

4.12.4 Cable Markers

No cable markers will be required. It will be expected of the appointed contractor to provide the GPS coordinates at each of the joints, terminations, bend points, service crossings, road crossings, optic fibre draw pits and link disconnection boxes and at 50m intervals.

4.12.5 Phase Rotation

The Contractor must ensure that the correct phase rotation be maintained at both substations and must do their own testing for this purpose.

4.12.6 Drum Inspection and Mounting

Upon delivery, the cable drum should be visually inspected for damage, which may have occurred during transport. The manufacturer’s seal on the inner and outer cable ends should be examined and the condition of armouring, serving and sheath inspected for mechanical damage. If the cable is found defective it shall not be installed and the cable shall be returned to the supplier for replacement.

During installation the cable should be carefully examined for any sign of damage as it leaves the drum. This is particularly important on the outer layers, where drum batten nails can cause damage.

If it is necessary to roll the cable drum, it should be rolled in the direction indicated by the arrow on the drum.

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The drum should be mounted on jacks, cable trailer or cable stands such that the cable is preferably pulled from the top and always in the direction opposite to that indicated by the arrow. When pulling from large drums, i.e. over 2m in diameter, the cable should be supported to prevent stressing the cable, from the drum to the trench on a suitable ramp.

To limit the chance of damage to the cable prior to removing the cable drum battens, a check should be done to ensure that the drum-spindle is level and permits even rotation of the drum.

During pulling there is a tendency for cable slack to accumulate on the drum, slack shall be avoided and one possible method to achieve this is to limit drum rotation by using plank brake shoes against one or both flanges of the drum.

4.12.7 Drum Position

Cable drums shall be positioned in line with the direction of cable pull.

4.12.8 Protection of Cables from Damage

Cables being drawn into place shall be kept clear of abrasive surfaces by suitable means, e.g. rollers, cable tiles, etc., to prevent any damage to the cable sheath. The cable must be placed in the trench without sustaining abrasion damage, and without allowing rocks etc., to fall into the trench.

On long cable runs where a cable changes direction, both horizontal and vertical, rollers shall be used to ensure a smooth pull and avoid damage to the cable. Cables, which are pulled into position by a winch, must use suitable cable stockings and swivels to prevent damage.

When laying cable by directional drilling, it is essential that the cable is not dragged over ground outside the drill hole or prepared trench, since abrasion is likely to damage the outer jacket and cause sheath faults.

4.12.9 Cable Pulling Tension

The tensions of the pull shall not exceed that specified by the manufacturers for the particular type and size of cable being pulled and shall be smoothly and continuously applied.

The maximum recommended pulling tensions when pulling a cable shall be specified by the contractor.

The trench or duct line should be set out so that any necessary deviations from a straight line occur over the largest possible radius. When pulling cable into duct lines incorporating bends lower maximum pulling tensions may be necessary to avoid the wire pulling rope cutting into the side of the duct.

Any winch used to pull cables shall have either a facility to automatically limit the pulling tension applied to a cable or a continuous reading dynamometer incorporated in the pulling arrangement to enable the actual pulling tension to be monitored.

Cable pulling pits are required at each significant change in cable route direction. The pits will be indicated, by the contractor, on the design drawing.

4.12.10 Pulling Speed

To avoid damage due to overruns, the cable should be pulled just fast enough to keep the drum rotating smoothly.

4.12.11 Cable Bending Radii

The bending radius of the trench (and cables) will be limited to 20 x the cable diameter or according to the supplier's specification. No twists or kinks are permitted.

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4.13 Fibre Optic Cable

An optical fibre cable shall be installed with the power cable for protection and communication purposes between Dalkeith and Lutz substations.

All work shall be done according to the standards and technical requirements as stated in the General Specification. All equipment shall also meet the standards and technical requirements as stated in the General Specification.

4.13.1 Fibre Optic Scope of Works

The scope of work shall include but not be limited to:

- Supply all equipment as per Specification and Schedule of Quantities.
- Install 48-core non-metallic DUCT fibre cable inside 40mm HDPE pipe underground (next to the power cable) between Dalkeith and Lutz substations.
- Install 48-way patch panels in the new cabinets (to be supplied by others) at each substation
- Terminate the fibre at both substations on the new patch panels (coil spare cable inside the trench

to allow 15m slack).

- Label the patch panel clearly to indicate the fibre source.
- Supply and install 4x 2m duplex patch leads.
- Supply and install 2x duplex, ruggedized, patch lead between the feeder protection panel (protection relay) and the fibre cabinet (length to be confirmed on site)
- Design and supply of a cable thermal monitoring system making use of a fibre optic cable installed in an optic sleeve on the phase conductors of the cable. (this may be an optional item).
  - o The system will be of the optical frequency-domain reflectometry or OFDR type.The system will monitor in real-time, to be able to predict e.g. the influence on a cable with a change in ambient temperature. All data will be fed into the SCADA system to enable pro-active responses during transient conditions.
  - o Thermal monitoring and protection will not share the same fibres.
- Test completed installation end to end as specified in the General Specification.
- Compile handover document including all test results as specified in CP_TSSPEC_109, PMLS and OTDR test results of complete installation and joint box positions.

4.13.2 Fibre Specification

The optical fibre cables to be installed and the installation of it shall comply with City Power’s latest standards and NRS standards as listed.

Optical fibre cables shall be of the compact duct type, polyethylene sheathed, with a high degree of reinforcement to protect the fibres from micro bending due to the rigors of handling and the environmental conditions experienced by fibre optic cable.

The fibre optic cable shall be a 48-core, dual window (1300/1550nm), single mode, non-dispersion shifted, non-metallic, DUCT fibre cable. The diameter over the outer sheath of the cable shall be not less than 9mm.

The thickness of the outer sheath shall be not less than 2mm.

Each optical fibre shall have a core diameter of 10 µm. Full particulars of the cable proposed need be submitted to the Engineer for approval.

Draw boxes with lockable lids shall be provided at all acute changes of direction, as well as at splicing positions.

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Supply and installation of twin fibre optic duct for future thermal monitoring as per drawing 112115-LUT-DW-S1-E-52 and CP_TSSPEC_150 – to be installed as part of the HV cable feeders.

4.13.2.1 Applicable Specifications

Document Type Description Reference Number Revision
NRS Specification DUCT and Direct-buried Underground
Fibre-optic Cable Part 1
NRS 088-1:2007 Edition 1
NRS Specification DUCT and Direct-buried Underground
Fibre-optic Cable Part 2
NRS 088-2:2009 Edition 1
NRS Specification Joint use of Structures for Power and
Telecommunication Lines
NRS 043:2005 Edition 2
NRS Specification Single-mode Non-dispersion Shifted
Optical Fibres
NRS 081:2005 Edition 1

City Power
Specification
Specification for Long Span All-Dielectric Self-Supporting Fibre Optical Cable (ADSS)
CP_TSSPEC_109 Rev 0

City Power
Specification
Specification for 40mm Direct Burial Protective Sleeve for Fibre Optic Cable
CP_TSSPEC_150 Rev 0

4.13.2.2 Patch Panel Specification

The fibre optic cable shall be secured on the outer sheath using a plastic compression gland where it enters the cabinet. The armouring of the cable shall be cut back 10 cm after the gland and shall be insulated using heat shrink or self-vulcanising tape. The armouring shall by no means be connected to the earth. At least 15m of slack should be left inside the trench for each cabinet.

The slack fibre optic cable shall be routed neatly on the inside of the cabinet without exceeding the minimum bending radius as specified by the manufacturer. The cable should be routed in such a way that the optic distribution frame and slack cable can be easily removed from the cabinet and the fibre will not be damaged during normal operation including maintenance work.

The inner sheath of the fibre optic cable shall be secured at its entry to the ODF unit by means of a plastic compression gland and the central strength member shall be securely fastened.

The fibres shall be neatly organised in the ODF with no twists or sharp bends. Plastic clips may be used to organise the bare fibres.

All fibres shall be spliced to non-ruggedised pigtails which terminate on ST connectors on the ODF to be available on the front of the ODF.

All ODFs must be clearly marked to indicate their source.

4.13.2.3 Distributed Temperature Sensing, (DTS), System Components and Minimum Specification and Technical Requirements

1. Fibre optic duct:
   a. Twin duct to be installed as part of the HV cable feeder.
2. Fibre:
   a. Suitable 4 or 8 unit blown fibre to be used as per supplier required duct size for thermal monitoring; and
   b. Fibre strands to be encapsulated in a multi-layer performance acrylate coating system - to protect fibre during installation, to provide micro bend resistance within operating temperature range and to provide low friction for blowing.

3. Distributed Temperature Sensing (DTS) Equipment:
   a. Single end distributed temperature sensing (DTS) equipment (inclusive of sensing optoelectronics and an on-board PC) to measure the distributed temperature over the cable route in real-time.
   b. The following information is to be provided by the tenderer:
      i. Sampling resolution.

ii. Spatial resolution. iii. Temperature resolution. iv. Minimum range. v. Number of input channels. 4. Dynamic cable rating (DCR) system using a thermal model of the cable in accordance with IEC 60287 and IEC 60853-2 and providing the following outputs: a. Conductor Temperature Calculation. b. Real Time Dynamic Thermal Rating Calculations. c. Offline Prediction & Cable Rating (e.g. during cable maintenance where there can be increased load). d. Alerts in the event of hotspot/fire. e. Seamless system integration (e.g. SCADA, ventilation control, electrical relay). 5. The DCR system cable thermal modelling algorithms needs to allow for the following: a. Differing cable constructions and sizes. b. Cable configuration (e.g. trefoil, flat formation). c. Sensing cable integrated into power cable. d. Sensing cable installed on outer surface. e. Cable environment (buried, tunnels & culverts). f. User friendly user-interface. 6. Communication options: a. ON SITE: Laptop serial RS-232 or other interface; and b. OFF SITE: Wired-Ethernet connection for SCADA, via ADSL, GSM, GPRS, etc. 7. Data storage: a. On-board data-storage for DTS equipment – with external SB drive; b. Real time, Daily, Weekly or Monthly downloads data sets (Real time view as per system interface requirements); and c. Temperature and Load triggers and alarms. 8. DCRS format: a. Software package with input – output modelling and results. 9. Frequency domain reflectometry (FDR) vs Time domain reflectometry (TDR): a. Both options allowed. 10. Single end mode measurement vs double end mode measurement: a. Single end measurement preferred. 11. Multi-mode measurement: a. Preferred to have up to 8 inputs. 4.13.2.4 Terminations and Joints All joints shall be fusion type splices and shall meet the following testing criteria: • Maximum Splice Loss ≤ 0.1 dB • Mean Splice Loss ≤ 0.075 dB 4.13.2.5 Testing Testing shall be done according to: • NRS 088-2:2009 for DUCT Page 46 of 63 Tender No. Dalkeith – Lutz 132kV Cable 4.14 Protection Requirements Although protection does not form part of this tender it may be required from the Contractor to supply and install protection schemes in accordance with the latest Eskom scheme. There is a provisional cost allowed for in the price bill to cover the cost if this option is required. Primary protection of HV cable feeders shall be of current differential protection utilising fibre optic communication link between the Dalkeith and Lutz substation. Backup protection shall be directional overcurrent and earth fault. Thermal monitoring may be implemented on this project on both circuits.		

4.15 Cable Tests

Factory and site acceptance tests must be performed as specified in accordance with SANS 60840 and witnessed by the engineer if required. The cable shall not be dispatched from the factory without the tests being completed. The following factory tests will apply:

- **Conductor examination (see 10.4 of SANS 60840);**
- **Measurement of electrical resistance of conductor and of metallic screen (see 10.5 of SANS 60840);**
- **Measurement of thickness of insulation and oversheath (see 10.6 of SANS 60840);**
- **Measurement of thickness of metallic sheath (see 10.7 of SANS 60840);**
- **Measurement of diameters, if required (see 10.8 of SANS 60840);**
- **Hot set test for XLPE, EPR and HEPR insulations (see 10.9 of SANS 60840);**
- **Measurement of capacitance (see 10.10 of SANS 60840);**
- **Measurement of density of HDPE insulation (see 10.11 of SANS 60840);**
- **Water penetration test, if applicable (see 12.4.18 of SANS 60840); and**
- **Tests on components of cables with a longitudinally applied metal foil (see 12.4.19 of SANS 60840).**

The insulation test shall be by means of an applied low frequency AC voltage (not DC).

Outer sheath tests shall routinely be performed immediately after the installation and backfilling of a length of cable, so that repairs, if required, can be done at that stage.

Cables to be graphite coated to aid with sheath testing.

Cables shall be pressure-tested and the exact leakage current shall be tabulated and certified.

All test results shall be recorded and certified.

4.16 As-built Drawings

On completion of the Contract the Contractor will supply two hard copies and an electronic copy, in dwg and dxf format, of the as-built drawings. The hard copies shall be plotted on a suitable scale on A0 paper and where, required, overlap such in order to ease continuity between sheets. The electronic copy's scale shall be 1:1 in the L031 WGS84 projection system.

The following information shall be indicated on the geographical plans:

- **All relevant features such as fences, cadastral information, tracks, rivers, watercourses, pipelines, telecommunication circuits, power lines, railways, dwellings and any other obstructions.**
- **Cable numbers and cable depths.**

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- **Positions of all joints, terminations, sleeves or ducts.**

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5. Quality Plan

The Contractor is to produce and submit a quality plan and construction program to the Employer, for approval, before site establishment.

The quality plan must indicate the control points for quality to ensure that the works are done according to specification and should also cover the following:

- **Cable trenching.**
- **Cable installation.**
- **Cable trench backfilling.**
- **Cable joints, cable terminations.**
- **Cable data requirements, etc.**

The Contractor is required to employ a competent supervisor or foreman on site

for the duration of the project
to implement workmanship quality checks.
Inspections and quality checks on installations completed by the contractor will be conducted prior to hand-over of the project.
In general the installation should be completed to the satisfaction of the requirements of this design document
and that the workmanship during the construction phase should comply with the expected local industry
standards.
Any defects or non-compliant workmanship must be rectified by the contractor before the project can be
handed over.
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Ground and
surface water
management
 No vehicles will be serviced on site.
 All chemical, oil, diesel or petrol spills must be contained immediately
and reported to the City Power Environmental Coordinator.
 Storm water run-off must be managed in areas where it may negatively
impact on the structures of power lines. Measures should be
implemented to ensure that run-off water on the servitude does not run
into dongas and cause an erosion hazard.
Project
Management
Health and
safety
 It is the responsibility of City Power to ensure that all construction and
operational processes and procedures are compliant with the relevant
health and safety regulations.
All
Dust Control Burning of waste material such as vegetation resulting from
maintenance activities at the site is strictly prohibited.
 Drive at moderate speed on site access roads to minimise or avoid dust
pollution. In urban areas, access roads should be treated to reduce dust
pollution (tar, concrete, chip stone, spraying with water etc.).
 All site workers shall wear face masks when creating dust.
Project
Management
Noise Control City Power must comply with Health and Safety legislation that an
overall noise rating level in areas where more than one noise source is
placed is less than 85Db.
 Avoid very noisy activities at times which would cause disturbance to
neighbours.
 Keep to site hours
 All site workers shall use hearing protection when needed.
Project
Manager
Community
Issues
 A list of neighbouring properties, property owner's names, addresses
and telephone numbers and land use shall be drawn up.
 A plan of action shall be concluded with neighbouring property owners
and the relevant authorities in the case of an emergency (veld fire, oil
spillage or water contamination.
 Property owners and local residents shall be treated with respect at all
times.
 Environmental clauses shall be included in contract documents for all
contractors.

 All complaints shall be reported, recorded and investigated.
All
Bush
Clearance
 Tree and bush clearance will be strictly limited to the minimum specified in City Power construction specifications.
Management objective
- Minimise vegetation interference to flow of electricity.
- Minimise possibility of erosion due to removal of vegetation.
Measurable target
- No vegetation interference with structures and statutory distances upon completion of the contract.
Project
Management
Flora
(Common,
rare and
endangered
plants)
 No endangered species (flora /fauna) must be removed or damaged. Where there is doubt, expert advice must be obtained.
 When a rare or endangered plant is to be removed, the Department of Water Affairs and Forestry must be contacted.
 No person is allowed to sell, offer, keep or convey any weed in the country.
Management objective
- Minimal disturbance to vegetation where such vegetation does not interfere with construction and operation of the line.
- Prevention of litigation concerning removal of vegetation.
Measurable Target
- No litigation concerning removal of vegetation.
All
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Oil
Management
♣ Insulating oil and related hydrocarbons pose a serious pollution problem when released into the environment. Not only do these compounds pose a fire hazard, but with one litre of oil having the potential to contaminate in excess of a million litres of water, it needs to be handled with care.
♣ Oil can rapidly penetrate certain soil types, which may lead to extensive soil contamination as well as groundwater and surface water contamination. The Water Act 36 of 1998, states that hydrocarbons should not touch the soil or water and if they do, they shall be cleaned or removed immediately.
♣ Appropriate containment facilities/spill kits shall be used to prevent spilled or leaked transformer oil from contaminating surface or groundwater.
♣ Bund walls shall be installed.
Project
Management
Materials
Storage
♣ Store chemicals such as fertilisers and herbicides in a labelled lock, which has an impervious floor.
♣ All chemicals shall have a Material Safety data Sheets (MSDS).
Project Manager
Contingency
Plan
♣ Contingency plans for fire, oil and water contamination, etc, shall be

planned in conjunction with neighbouring landowners, local villages and the municipality.

Oil spillage response

The following steps shall be adhered to should an oil spill occur.

1. Assess the risk
♣ Determine risks that may affect human health, the environment and property and create unsafe conditions.
♣ ALWAYS put SAFETY first.

2. Confine the spill
♣ Limit the area by blocking, diverting or confining the spill.
♣ Use absorbents such as socks and booms as found in spill kits.
♣ SPEED COUNTS, stop the flow of the oil before it enters storm water drains and contaminate water resources.

3. Stop the source
♣ After the spill is confined, stop the source of the spill e.g. Turn a container upright, plug a leak, transfer oil from damaged container to a new one or place the leaking equipment in a drip tray.
♣ Prevent unauthorised access to the spill site.

4. Assessment of the Spillage
♣ Assess the spill using the Model Oil Spill Assessment.

5. Evaluate the incident and implement clean up
♣ Reassess the incident and develop a plan of action e.g. place pillows and mat pads (found in spill kits) throughout the spill area to absorb the spill.

6. Report the spill
♣ To the Depot Manager/ Team Leader immediately after a spill occur.
♣ The Environmental Officer (011) 490 7238 shall also be notified of the incident.
♣ City Power oil spill clean-up contractors: Rapid Spill Response
Margen Service
Enviroserve
SRT Wastemen

NOTE: Oil spill kits and oil absorbent materials can be obtained from the above mentioned oil clean up contractors.

Project
Management
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7. Pollution clean up
♣ The appointed oil clean up contractor shall clean the spillage to acceptable levels.

8. Disposal of material
♣ All material accumulated during the spill shall be treated as hazardous and must be disposed properly in permitted waste disposal sites by the appointed oil clean up contractor.

9. Complete required documents
♣ Complete oil spill Register and send to Environmental Coordinator.

10. Environmental requirements
♣ Every site shall have an oil spill kit to contain oil.
♣ Areas where there are oil leakages, drip trays and oil absorbing material shall be used to prevent the spreading of possible oil pollution.

Monitoring To ensure the undertaking and conformance to the EMP, a monitoring program shall be instituted. The monitoring program can be used to identify environmental issues and impacts that have not been accounted for in the EMP that are or could result in significant environmental impacts for which corrective action is required. The program can also be used to identify findings that can be used to improve other EMPs.

Monitoring must form part of the contract or work instruction. City Power (Project Manager) and the contractor must establish the period and

frequency.
It is recommended that:
1. This EMP is viewed as a living document that should change to suit the needs of the project. All amendments are to be done in consultation with the relevant role players.
2. The EMP must be presented and explained to the Construction team and/or contractors to sensitise them to pertinent environmental agreements and conditions.
3. That site visits be conducted at intervals for the duration of the project by the Environmental Coordinator, representatives from planning execution, project management as well as affected parties as deemed necessary.
4. A regular monitoring program to be in place to not only ensure conformance to the EMP but also to monitor environmental issues and impacts that have not been accounted for in the EMP that are or could result in significant environmental impacts for which corrective action is required.
5. A post-construction audit is conducted to identify non-conformance for which corrective action must be taken. Corrective action must take place before the contract is completed or signed off.
6. Safety signs and procedures must be adhered to during the installation as stipulated in the Occupational Health and Safety Act (Act 85 of 1993). Avoid unnecessary congestion and disruption of traffic and pedestrians during installation. Warning signs and contact details should be displayed during construction.
7. Re-instate the surface area and effected areas after trenching and installation as to the existing layout i.e. to its original condition. This includes tar roads and driveways, paving, curbs, grass, drainage systems and other servitudes. Level and clear site to satisfaction of landowner and municipal by-laws.
Final Site
Inspection/
Post
construction
Final site inspection must be conducted to ensure that site has been re-instated. Considering the condition of the land in the study area, upon which the development is to take place, the impact of this development seems to outweigh any negative impacts that might occur if mitigation measures are implemented effectively.
All
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5. ENVIRONMENTAL COMPLIANCE
For all projects whereby a Record of Decision (RoD) has been granted, the contractor shall strictly adhere to
the following:
♣ City Power Generic Environmental Management Plan (EMP),
♣ The specific conditions of RoD issued by Gauteng Department of Agriculture and Rural Development
(GDARD) and
♣ EMP approved by GDARD.
Table 1: MODEL OIL SPILL ASSESSMENT TABLE
Using your judgement and the facts available, allocate the relevant points (1, 3 or 5) to each of the following and add
them together. The cumulative score will dictate the appropriate corrective action.
Condition 1 3 5
Source of the spill Weep Drip/Leak Explosion/Incident
Age of spill Historic Happened recently -
spill still moist Happened within last 24h

Threat to any water
body No threat Threat with rain Access to waterway
Containment
Leak is minor − can be
controlled, contained and
plugged with oil spill kit
Leak is moderate −
cannot be
successfully
managed with spill
kit.
Leak is serious,
containment is impossible
Life threatening
Conditions Not at all
Moderate
(Environmental or
health risk only)
Serious
(Explosion, fire, health and
major environmental)
Weather conditions Good weather and will last
until spill is cleared
Moderate, but may
change suddenly to
weather conditions
which will hamper
containment
Raining
Properties affected None
On-site (Only City
Power's property is
affected)
Off-site (City Power's
neighbouring properties
and public roads)
≥25 points
Public relations
threat Small Medium Large
Soil types Clay or compacted ground Loose or loam soil Sandy soil and Gravel
Traffic implications Not on any road Public road Road closed
PCB presence* None Less than 20 ppm in
the oil
Over 20 ppm in the oil will
automatically get ≥25
points
Total score Sub total Sub total Sub total
Signature____________Name____________Date___________Site______________
Page 55 of 63
Tender No. Dalkeith – Lutz 132kV Cable
Minor spill
≤ 12 points
Moderate spill
13 – 24 points
Major spill
≥ 25 points
Clean-up must be performed and
a report issued to the
Environmental co-ordinator.
Contain and call in the assistance of

the Environmental co-ordinator.
Contain, call on Environmental co-ordinator who will assess the situation and if needed call upon an emergency response team.
***If the PCB levels of the oil are not known through prior testing, the spill shall be treated as a PCB spill, until such time that analysis proves otherwise.**

6. NORMATIVE REFERENCES

The following documents contain provisions that, through reference in the text, constitute requirements of this procedure. At the time of publication, the editions indicated were valid. All standards and specifications are subject to revision, and parties to agreements based on this procedure are encouraged to investigate the possibility of applying the most recent editions of the documents listed below.

♣ City Power Safety, Health, Environmental and Quality Policy.
♣ City Power Environmental Management System Directive.
♣ Environmental Impact Assessment regulations in terms of chapter 5 of the National Environmental Management Act, 1998

ANNEXURE A: ENVIRONMENTAL LEGISLATION

1. ATMOSPHERIC POLLUTION PREVENTION ACT, NO. 45 OF 1965
2. CONSERVATION OF AGRICULTURAL RESOURCES ACT, NO. 43 OF 1983
3. ENVIRONMENT CONSERVATION ACTS, NO. 73 OF 1989
4. FENCING ACT, NO. 31 OF 1963
5. NATIONAL FOREST ACT, NO. 84 OF 1998
6. HAZARDOUS SUBSTANCES ACT, NO. 15 OF 1973
7. LAND SURVEY ACT, NO. 8 OF 1997
8. NATIONAL ENVIRONMENTAL MANAGEMENT ACT, NO. 107 1998
9. NATIONAL HERITAGE RESOURCES ACT, NO. 27 OF 1999
10. NATIONAL PARKS ACT, NO. 57 OF 1976
11. NATIONAL WATER ACT, NO. 36 OF 1998

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Tender No. Dalkeith – Lutz 132kV Cable

Annexure 2 - Cable Drawings and Diagrams

LUTZ CABLE PROJECT DRAWING REGISTER

Drawing Title Drawing Number Rev
General Arrangement Dalkeith Substation 112115-LUT-DW-S1-E-07.2 0
Sections Dalkeith Substation 112115-LUT-DW-S1-E-08.2 0
Trench Details 112115-LUT-DW-S1-E-52 0
Typical HV XLPE Single Core Joint Bay Layout 112115-LUT-DW-S1-E-53 0
HV XLPE Single Core Joint Bay Earthing Detail 112115-LUT-DW-S1-E-54 0
Manhole Detail HV Cable - Link Disconnection Box 112115-LUT-DW-S1-E-55 0
Manhole Detail HV Cable - Optic Fibre Draw Pit 112115-LUT-DW-S1-E-56 0
Lutz / Dalkeith Cable Route Plan 112115-LUT-DW-S1-E-60 0
88kV Cable Electrical Circuit Diagram 112115-LUT-DW-S1-E-61 0
Roads, Stormwater Layout and Longsections 112115-DALK-CIV-R-100 0
Road and Stormwater Details 112115-DALK-CIV-R-300 0

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Tender No. Dalkeith – Lutz 132kV Cable

Annexure 3 - Proposed Cable Length Requirements (To be finalised before manufacture)

Cable length Dalkeith - Lutz
From To
Distance
between
Joint
Bays
Joint

Bay
Length
Slack
Snaking Terms
Slack
Total Cable
required
Dalk sub JB1 360 10 4 8 2292
JB1 JB2 360 10 4 2244
JB2 JB3 360 10 4 2244
JB3 JB4 400 10 4 2484
JB4 JB5 400 10 4 2484
JB5 JB6 400 10 4 2484
JB6 JB7 400 10 4 2484
JB7 JB8 400 10 4 2484
JB8 JB9 400 10 4 2484
JB9 JB10 400 10 4 2484
JB10 JB11 400 10 4 2484
JB11 Lutz Sub 400 10 4 8 2532
4680 29184
Page 58 of 63
Tender No. Dalkeith – Lutz 132kV Cable
Annexure 4 – Applicable Standards and Specifications
General
Some of the Specifications are Generic and all irrelevant sections must be ignored.
The Tenderer shall complete all the technical schedules included in the various specifications included
in this Annexure.
Failure to provide the required information will render the Tender Non-Responsive and will lead to
disqualification.
No. Rev. Title and Publisher Attached
Y/N
CP_TSSPEC_029 1 Specification for Adjustable Cable Clamps Y
CP_TSSPEC_078 1 Specification for notices, danger and warning signs Y
CP_TSSPEC_117 2 Specification for station class, Metal-Oxide Surge Arrestors Y
CP_TSSPEC_150 0 Specification for 40mm direct burial protective sleeve for fibre optic cables Y
CP_TSSPEC_109 0 ADSS with optical fibre Y
CP_TSGUID_005 0 Guidelines for fibre optic installations Y
CP_TSSPEC_153 1 Specification for 132 kV cables Y
CP_TSSPEC_009 0 Specification for alternating current
disconnectors and earthing switches up to 145 kV Y
CP_TSSPEC_202 0 Specification for copper cladded steel conductor Y
NRS 077:2013 ED 2
XLPE-INSULATED CABLES AND ACCESSORIES FOR
SYSTEMS WITH NOMINAL VOLTAGES OF 44kV, 66kV,
88kV AND 132 kV
N
SANS 10198-13 1988
The selection, handling and installation of electric power
cables of rating not exceeding 33 kV Part 13: Testing,
commissioning and fault location
N
SANS 1186 - Symbolic safety signs. N
SANS 1200AA - Standardized specifications for civil engineering
construction – AA General (small works). N
SANS 1200C - Standardized specifications for civil engineering

construction – C Site Clearance. N
SANS 1200DA - Standardized specifications for civil engineering construction – Earthworks (small works). N
SANS 1200LB - Standardized specifications for civil engineering construction – LB Bedding (pipes). N
SANS 1200DB - Standardized specifications for civil engineering construction – DB Earthworks (pipe trenches). N
SANS 1200G - Standardized specifications for civil engineering construction – G Concrete (structural). N
SANS 1200GA - Standardized specifications for civil engineering construction – GA Concrete (small works). N
SANS 1200H - Standardized specifications for civil engineering construction – H Structural steelwork. N
SANS 1200HA - Standardized specifications for civil engineering construction – HA Structural steelwork (sundry items). N
SANS 1200HC -
Standardized specifications for civil engineering construction – HC Corrosion protection of structural steelwork.
N
SANS 1200M - Standardized specifications for civil engineering construction – M Roads (general). N
SANS 1200MF - Standardized specifications for civil engineering construction – MF Base. N
SANS 1200MM. - Standardized specifications for civil engineering construction – MM able and Accessories Review Process
Equipment Project Phase Activity Approval/Inspection/Tests Required Hold Points
Visual Dimensional Engineering
Design
Test and /
or
Inspection
HV Cable (incl. accessories)
Type Test
Certificates
All related type test
certificates for
Primary equipment
to be verified as
stipulated in
specification
Verified Hold
Design Phase Review and
approval of detailed
designs
Perform Perform Hold
Factory Testing Witnessing of
routine tests at
equipment factory
Verify Verify Witness Hold
Equipment
delivery to site
and inspection
Inspection of
equipment delivery
to site without
damage (payment
milestone for
equipment)

Verify Verify Installation Verify equipment installed to appropriate standards and in line with specification Verify Verify Site testing commissioning Witnessing of commissioning testing on site Witness Hold Final Inspection and handover Inspection of quality of installation works Witness Energising Witnessing on energising and on load measurements Witness End of DLP inspection Final inspection at the end of defects liability/notification period, retention released following this inspection Verify Verify Page 63 of 63 REFERENCE REV CP_TSSPEC_009 0 SPECIFICATION FOR ALTERNATING CURRENT DISCONNECTORS AND EARTHING SWITCHES UP TO 145 kV PAGE 15 OF 37 Item Sub- clause Description Schedule A Schedule B 14 Gland plate a) Minimum size mm 130 x 35 b) Material and thickness mm 5mm Aluminium 15 Protection of housings and mechanism boxes a) IP rating IP55 b) Material type 304 Stainless steel Metal finish a) Finish offered on ferrous parts (to be approved) xxxxx b) Finish offered on non-ferrous parts (to be approved) xxxxx c) Method of rectifying damaged galvanising (to be approved) xxxxx 16 Insulators		

Details of insulators offered
a) Manufacturer xxxxx
b) Type designation xxxxx
c) Number of units in stack xxxxx
d) Cantilever strength class Min kN 4
e) Torsoin strength N.m xxxxx
f) Compliance with profile requirements of
SANS 60185
g) Insulator material Porcelain/
Composite
17 Insulator test voltages
Lightning impulse withstand voltage referred to
sea level
a) To earth and between phases in the open
position kV 150
b) Across the isolating distance kV 172
Characteristic wave shape of impulse
(LIW = Lightning Impulse Withstand) µs 1,20/50
Tender Number: ____
Tenderer's Authorised Signatory: ________________________ ______________________
Name in block letters Signature
Full name of company: ____
REFERENCE REV
CP_TSSPEC_009 0
SPECIFICATION FOR ALTERNATING
CURRENT DISCONNECTORS AND
EARTHING SWITCHES UP TO 145 kV PAGE 16 OF 37
Item Sub-
clause Description Schedule A Schedule B
18 Insulator dimensions
a) Top flange PCD mm 76
b) Bottom flange mm 76
c) Overall height mm xxxxx
19 Insulator arcing distances mm xxxxx
20 Creepage distance mm/kV 31
21 Recommended spare parts xxxxx
22 Special tools required xxxxx
23 Tests
a) What type of test certification is available for
similar equipment? xxxxx
b) Period and value for short-time current test s 3
24 Marking/labelling/documentation
a) Language for labels, drawing, certificates
and manuals English
b) Number of instruction manuals required 2 per unit
25 Mass details
a) Complete disconnector without earthing
switch kg xxxxx
b) Complete disconnector with single earthing
switch kg xxxxx
c) Complete disconnector with double earthing
switch kg xxxxx
d) Separate earthing switch kg xxxxx
Tender Number: ____
Tenderer's Authorised Signatory: _________________________ ________________________
Name in block letters Signature
Full name of company: ____
REFERENCE REV
CP_TSSPEC_009 0
SPECIFICATION FOR ALTERNATING

CURRENT DISCONNECTORS AND
EARTHING SWITCHES UP TO 145 kV PAGE 17 OF 37
Technical schedule A and B
Deviation schedule
Any deviations offered to this specification shall be listed below with reasons for deviation.
In addition, evidence shall be provided that the proposed deviation will at least be more cost-
effective than that specified by City Power.
Item Sub-clause of
CP_TSSPEC_009
Proposed deviation
Tender Number: ____
Tenderer's Authorised Signatory: ________________________ ______________________
Name in block letters Signature
Full name of company: ____
REFERENCE REV
CP_TSSPEC_009 0
SPECIFICATION FOR ALTERNATING
CURRENT DISCONNECTORS AND
EARTHING SWITCHES UP TO 145 kV PAGE 18 OF 37
Annex C - Technical schedules A and B for 33 kV disconnector (hand-operated)
and 33 kV separate earthing switch
Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered
Item Sub-
clause Description Schedule A Schedule B
1 Service condition
a) altitude up to m 1800
b) ambient temperature Max o C 40
Min o C -10
c) relative humidity Max % 90
d) level of pollution Very Heavy
e) lightning area Yes
2 Disconnector
a) type of disconnector required CRPDB
b) earthing facility required Yes
single earthing switch Yes
double earthing switches Yes
c) arrangement of phases, in-line or transverse Transverse
3 Details of disconnector
a) manufacturer xxxxx
b) type designation xxxxx
c) number of breaks 2
d) isolating distance mm xxxxx
e) main contacts xxxxx
1) entry Friction
2) type xxxxx
3) contact force N xxxxx
4) materials xxxxx
5) wear allowance xxxxx
Tender Number: ____
Tenderer's Authorised Signatory: ________________________ ______________________
Name in block letters Signature
Full name of company: ____
REFERENCE REV
CP_TSSPEC_009 0
SPECIFICATION FOR ALTERNATING
CURRENT DISCONNECTORS AND

EARTHING SWITCHES UP TO 145 kV PAGE 19 OF 37
Item Sub-
clause Description Schedule A Schedule B
4 Details of earthing switch
a) manufacturer xxxxx
b) type designation xxxxx
c) number of breaks 1
d) isolating distance mm xxxxx
e) main contacts xxxxx
1) entry xxxxx
2) type xxxxx
3) contact force N xxxxx
4) materials xxxxx
5) wear allowance xxxxx
5 Disconnector rating
a) nominal system r.m.s voltage (U n) kV 33
b) nominal continous rated current A 1600
c) nominal short-time withstand current kA 25
d) short-time withstand current duration s 3
e) rated peak withstand current (dynamic) kA 50
f) 60-second power frequency withstand r.m.s
voltage Min kV 70
g) lightining impulse withstand peak voltage Min kV 200
h) phase spacing mm 1200
i) isolating distance mm xxxxx
6 Earthing switch ratings
a) nominal system r.m.s voltage (Un) kV 33
b) maximum system r.m.s. voltage (Um) kV 36
c) nominal short-time withstand current kA 25
d) short-time withstand current duration s 3
e) rated peak withstand current (dynamic) kA 50
7 Mounting of disconnectors/earthing switches
a) is mounting structure for isolator to be
provided by the supplier? Yes
Tender Number: ____
Tenderer's Authorised Signatory: ________________________ ______________________
Name in block letters Signature
Full name of company: ____
REFERENCE REV
CP_TSSPEC_009 0
SPECIFICATION FOR ALTERNATING
CURRENT DISCONNECTORS AND
EARTHING SWITCHES UP TO 145 kV PAGE 20 OF 37
Item Sub-
clause Description Schedule A Schedule B
b) is mounting structure for the separate earthing
switch to be provided by the supplier? Yes
c) mounting of disconnector upright, horizontal
or vertical? xxxxx
8 Method of operation, i.e. hand, electric motor or
other Hand
9 For hand operation
a) horizontal or vertical movement offered? xxxxx
b) are interlocking facilities required? Yes
if yes, details Mechanical
c) requirements for earthing of vertical shaft
50 mm 2 , PVC-
insulated,
braided, tinned
copper strap

10 Are spark gaps and arcing horn required? Yes **11 Auxiliary switches** **a) Number of contacts for disconnectors** **Type G 8** **Type M 5** **Type F 1** **Type N 2** **Type D** **b) Number of contacts for earthing switches** **Type M 4** **Type N 4** **c) Rotating of auxiliary switches** **1) Continuous current A 10** **2) Current overload for 1 s A 100** **12 Each main terminal to be an aluminium flat** **pad of the following** **a) No of holes/pitch mm 8 x 50** **b) Diameter mm 14** **Tender Number: ____** **Tenderer's Authorised Signatory: _______________________ _____________________** **Name in block letters Signature** **Full name of company: ____** **REFERENCE REV** **CP_TSSPEC_009 0** **SPECIFICATION FOR ALTERNATING** **CURRENT DISCONNECTORS AND** **EARTHING SWITCHES UP TO 145 kV PAGE 21 OF 37** **Item Sub-** **clause Description Schedule A Schedule B** **13 Secondary terminals if other than spring-** **loaded** **a) Type and make offered for approval xxxxx** **14 Gland plate** **a) Minimum size mm 130 x 35** **b) Material and thickness mm 5mm** **Aluminium** **15 Protection of housings and mechanism** **boxes** **a) IP rating IP55** **b) Material type 304 Stainless** **steel** **Metal finish** **a) Finish offered on ferrous parts (to be** **approved) xxxxx** **b) Finish offered on non-ferrous parts (to be** **approved) xxxxx** **c) Method of rectifying damaged galvanising (to** **be approved) xxxxx** **16 Insulators** **Details of insulators offered** **a) Manufacturer xxxxx** **b) Type designation xxxxx** **c) Number of units in stack xxxxx** **d) Cantilever strength class Min kN 4** **e) Torsoin strength N.m xxxxx** **f) Compliance with profile requirements of** **SANS 60185 xxxxx** **g) Insulator material Porcelain/** **Composite** **17 Insulator test voltages**		

Lightning impulse withstand voltage referred to
sea level
a) To earth and between phases in the open
position kV 200
Tender Number: ____
Tenderer’s Authorised Signatory: _____________________ ___________________
Name in block letters Signature
Full name of company: ____
REFERENCE REV
CP_TSSPEC_009 0
SPECIFICATION FOR ALTERNATING
CURRENT DISCONNECTORS AND
EARTHING SWITCHES UP TO 145 kV PAGE 22 OF 37
Item Sub-
clause Description Schedule A Schedule B
b) Across the isolating distance kV 230
Characteristic wave shape of impulse
(LIW = Lightning Impulse Withstand) µs 1,20/50
18 Insulator dimensions
a) Top flange PCD mm 76
b) Bottom flange mm 76
c) Overall height mm xxxxx
19 Insulator arcing distances mm xxxxx
20 Creepage distance mm/kV 31
21 Recommended spare parts xxxxx
22 Special tools required xxxxx
23 Tests
a) What type of test certification is available for
similar equipment? xxxxx
b) Period and value for short-time current test s 3
24 Marking/labelling/documentation
a) Language for labels, drawing, certificates
and manuals English
b) Number of instruction manuals required 2 per unit
25 Mass details
a) Complete disconnector without earthing
switch kg xxxxx
b) Complete disconnector with single earthing
switch kg xxxxx
c) Complete disconnector with double earthing
switch kg xxxxx
d) Separate earthing switch kg xxxxx
Tender Number: ____
Tenderer’s Authorised Signatory: ______________________ _____________________
Name in block letters Signature
Full name of company: ____
REFERENCE REV
CP_TSSPEC_009 0
SPECIFICATION FOR ALTERNATING
CURRENT DISCONNECTORS AND
EARTHING SWITCHES UP TO 145 kV PAGE 23 OF 37
Technical schedule A and B
Deviation schedule
Any deviations offered to this specification shall be listed below with reasons for deviation.
In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.
Item Sub-clause of
CP_TSSPEC_009

Proposed deviation
Tender Number: ________________________________
REFERENCE REV
CP_TSSPEC_009 0
SPECIFICATION FOR ALTERNATING
CURRENT DISCONNECTORS AND
EARTHING SWITCHES UP TO 145 kV PAGE 31 OF 37
Item Sub-
clause Description Schedule A Schedule B
4 Details of earthing switch
a) manufacturer xxxxx
b) type designation xxxxx
c) number of breaks 1
d) isolating distance mm xxxxx
e) main contacts xxxxx
1) entry xxxxx
2) type xxxxx
3) contact force N xxxxx
4) materials xxxxx
5) wear allowance xxxxx
5 Disconnector rating
a) nominal system r.m.s voltage (U n) kV 132
b) nominal continous rated current A 1600
c) nominal short-time withstand current kA 25
d) short-time withstand current duration s 3
e) rated peak withstand current (dynamic) kA 63
f) 60-second power frequency withstand r.m.s
voltage Min kV 230
g) lightining impulse withstand peak voltage Min kV 550
h) phase spacing mm 3000
i) isolating distance mm xxxxx
6 Earthing switch ratings
a) nominal system r.m.s voltage (U n) kV 132
b) maximum system r.m.s. voltage (U m) kV 145
c) nominal short-time withstand current kA 25
d) short-time withstand current duration s 3
e) rated peak withstand current (dynamic) kA 63
7 Mounting of disconnectors/earthing switches
a) is mounting structure for isolator to be
provided by the supplier? Yes
Tender Number: ____
Tenderer's Authorised Signatory: _______________________ _____________________
Name in block letters Signature
Full name of company: ____
REFERENCE REV
CP_TSSPEC_009 0
SPECIFICATION FOR ALTERNATING
CURRENT DISCONNECTORS AND
EARTHING SWITCHES UP TO 145 kV PAGE 32 OF 37
Item Sub-
clause Description Schedule A Schedule B
b) is mounting structure for the separate earthing
switch to be provided by the supplier? Yes
c) mounting of disconnector upright, horizontal
or vertical? xxxxx
8 Method of operation, i.e. hand, electric motor or
other Electric
Motor
9 For electric motor operation
a) control voltage AC supply voltage V ac 230

DC supply voltage V dc 110
b) rated power W xxxxx
c) nominal continuous rated current A xxxxx
d) maximum current A xxxxx
e) motor operating times
Open to close s xxxxx
Close to open s xxxxx
f) alternative control switch labelling xxxxx
g) are interlocking arrangements required (interlocking only required when earthing switch is used) Yes
h) Local/Off/Remote switch required with N/O auxiliary contact status indication xxxxx
10 Are spark gaps and arcing horn required? Yes
11 Auxiliary switches
a) Number of contacts for disconnectors
Type G 8
Type M 5
Type F 1
Type N 2
Type D
b) Number of contacts for earthing switches
Type M 4
Type N 4
Tender Number: ____
Tenderer's Authorised Signatory: _________________________ ______________________
Name in block letters Signature
Full name of company: ____
REFERENCE REV
CP_TSSPEC_009 0
SPECIFICATION FOR ALTERNATING CURRENT DISCONNECTORS AND EARTHING SWITCHES UP TO 145 kV PAGE 33 OF 37
Item Sub-clause Description Schedule A Schedule B
c) Rotating of auxiliary switches
1) Continuous current A 10
2) Current overload for 1 s A 100
12 Each main terminal to be an aluminium flat pad of the following
a) No of holes/pitch mm 8 x 50
b) Diameter mm 14
13 Secondary terminals if other than spring-loaded
a) Type and make offered for approval xxxxx
14 Gland plate
a) Minimum size mm 130 x 75
b) Material and thickness mm 5 mm aluminium
15 Protection of housings and mechanism boxes
a) IP rating IP55
b) Material type 304 stainless steel
Metal finish
a) Finish offered on ferrous parts (to be approved) xxxxx
b) Finish offered on non-ferrous parts (to be approved) xxxxx

c) Method of rectifying damaged galvanising (to be approved)
16 Insulators
Details of insulators offered
a) Manufacturer xxxxx
b) Type designation xxxxx
c) Number of units in stack xxxxx
d) Cantilever strength class Min kN 4
e) Torsoin strength N.m xxxxx
f) Compliance with profile requirements of SANS 60185 xxxxx
g) Insulator material Porcelain/ Composite
Tender Number: ____
Tenderer’s Authorised Signatory: __________________________ ________________________
REFERENCE REV
CP_TSSPEC_009 0
SPECIFICATION FOR ALTERNATING
CURRENT DISCONNECTORS AND
EARTHING SWITCHES UP TO 145 kV PAGE 34 OF 37
Name in block letters Signature
Full name of company: ____
REFERENCE REV
CP_TSSPEC_009 0
SPECIFICATION FOR ALTERNATING
CURRENT DISCONNECTORS AND
EARTHING SWITCHES UP TO 145 kV PAGE 35 OF 37
Item Sub-clause Description Schedule A Schedule B
17 Insulator test voltages
Lightning impulse withstand voltage referred to sea level
a) To earth and between phases in the open position kV 550
b) Across the isolating distance kV 630
Characteristic wave shape of impulse
(LIW = Lightning Impulse Withstand) µs 1,20/50
18 Insulator dimensions
a) Top flange PCD mm 76
b) Bottom flange mm 76
c) Overall height mm xxxxx
19 Insulator arcing distances mm xxxxx
20 Creepage distance mm/kV 31
21 Recommended spare parts xxxxx
22 Special tools required xxxxx
23 Tests
a) What type of test certification is available for similar equipment? xxxxx
b) Period and value for short-time current test s 1
24 Marking/labelling/documentation
a) Language for labels, drawing, certificates and manuals English
b) Number of instruction manuals required 2 per unit
25 Mass details
a) Complete disconnector without earthing switch kg xxxxx
b) Complete disconnector with single earthing switch kg xxxxx
c) Complete disconnector with double earthing switch kg xxxxx

d) Separate earthing switch kg xxxxx
Tender Number: ____
Tenderer's Authorised Signatory: ________________________ _______________________
Name in block letters Signature
Full name of company: ____
REFERENCE REV
CP_TSSPEC_009 0
SPECIFICATION FOR ALTERNATING
CURRENT DISCONNECTORS AND
EARTHING SWITCHES UP TO 145 kV PAGE 36 OF 37
Technical schedule A and B
Deviation schedule
Any deviations offered to this specification shall be listed below with reasons for deviation.
In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.
Item Sub-clause of
CP_TSSPEC_009
Proposed deviation
Tender Number: ____
Tenderer's Authorised Signatory: ________________________ _______________________
Name in block letters Signature
Full name of company: ____
REFERENCE REV
CP_TSSPEC_009 0
SPECIFICATION FOR ALTERNATING
CURRENT DISCONNECTORS AND
EARTHING SWITCHES UP TO 145 kV PAGE 37 OF 37
Annex D – Stock Items
It is not intended that City Power should keep stock of these items.
REFERENCE REV
CP_TSSPEC_029 1
SPECIFICATION FOR ADJUSTABLE CABLE
CLAMPS
PAGE 2 OF 17
ANNEX C – Item 3 - CLAMP CAB SIZE 50-7 REFERENCE REV
CP_TSSPEC_029 0
SPECIFICATION FOR ADJUSTABLE CABLE
CLAMPS
PAGE 14 OF 17
Item 3 - CLAMP CAB SIZE 50-75 DOUBLE – SAP NO. 459
Deviation schedule
Any deviations offered to this specification shall be listed below with reasons for deviation.
In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by City Power.
Item Sub clause of
CP_TSSPEC_029
Proposed deviation
Tender Number: ____
Tenderer's Authorised Signatory: ____
Name in block letters Signature
Full name of company: ____
REFERENCE REV
CP_TSSPEC_029 0
SPECIFICATION FOR ADJUSTABLE CABLE
CLAMPS
PAGE 15 OF 17

ANNEX C – Item 4 - CLAMP CAB SIZE 75-100 DOUBLE – SAP NO. 460
Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered
Item Sub clause of
CP_TSSPEC_029
Description Schedule A Schedule B
1 Manufacturer xxxxx
2 2.1.1 Material of cable clamp Polypropylene
3 2.3 Does the design of the clamp
comply with the drawing? Yes/No Yes
4 2.3 Do the threaded rod lengths
comply? (220mm / 380mm)
Yes/No Yes
5 3.2 Do the accessories comply? Yes/No Yes
6 4
Do the cable clamps comply with
the marking, labelling and
packing?
Yes/No Yes
7 4.2.3 SAP numbers on the label Yes/No Yes
8 4.3.2 Installation instructions Yes/No Yes
Tender Number: ____
Tenderer's Authorised Signatory: ____________________________________
Name in block letters Signature
Full name of company: ____
REFERENCE REV
CP_TSSPEC_029 0
SPECIFICATION FOR ADJUSTABLE CABLE
CLAMPS
PAGE 16 OF 17
Item 4 - CLAMP CAB SIZE 75-100 DOUBLE – SAP NO. 460
Deviation schedule
Any deviations offered to this specification shall be listed below with reasons for deviation.
In addition, evidence shall be provided that the proposed deviation will at least be more cost-
effective than that specified by City Power.
Item Sub clause of
CP_TSSPEC_029
Proposed deviation
Tender Number: ____
Tenderer's Authorised Signatory: ____________________________________
Name in block letters Signature
Full name of company: ____
REFERENCE REV
CP_TSSPEC_029 0
SPECIFICATION FOR ADJUSTABLE CABLE
CLAMPS
PAGE 17 OF 17
Annex D – Stock Items
Material Group : NET-ACCS
Item SAP
N
o
.
SAP Short Description SAP Long Description
1 457 CLAMP CAB SIZE 50-75 SINGLE
CLAMP, ADJUSTABLE, SINGLE, SIZE 50-75, SUITABLE TO CLAMP
A CABLE ON A WALL WITH AN OUTSIDE DIAMETER BETWEEN
50MM AND 75MM, COMPLETE WITH 220MM X M10 THREADED

ROD AND ACCESSORIES. ITEM SPECIFICATION CP_TSSPEC_029
2 458 CLAMP CAB SIZE 75-100 SINGLE
CLAMP, ADJUSTABLE, SINGLE, SIZE 75-100, SUITABLE TO CLAMP A CABLE ON A WALL WITH AN OUTSIDE DIAMETER BETWEEN 75MM AND 100MM, COMPLETE WITH 220MM X M10 THREADED ROD AND ACCESSORIES. ITEM SPECIFICATION CP_TSSPEC_029
3 459 CLAMP CAB SIZE 50-75 DOUBLE
CLAMP, ADJUSTABLE, DOUBLE, SIZE 50-75, SUITABLE TO CLAMP A CABLE ON A WALL WITH AN OUTSIDE DIAMETER BETWEEN 50MM AND 75MM, COMPLETE WITH 380MM X M10 THREADED ROD AND ACCESSORIES. ITEM SPECIFICATION CP_TSSPEC_029
4 460 CLAMP CAB SIZE 75-100 DOUBLE
CLAMP, ADJUSTABLE, DOUBLE, SIZE 75-100, SUITABLE TO CLAMP A CABLE ON A WALL WITH AN OUTSIDE DIAMETER BETWEEN 75MM AND 100MM, COMPLETE WITH 380MM X M10 THREADED ROD AND ACCESSORIES. ITEM SPECIFICATION CP_TSSPEC_029
REFERENCE REV
TITLE SPECIFICATION FOR NOTICES, DANGER AND WARNING SIGNS
CP_TSSPEC_078 1
DATE: JANUARY 2011
PAGE: 1 OF 21
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FOREWORD

Recommendations for corrections, additions or deletions should be addressed to the:

Technology Services Manager & BIRP
City Power Johannesburg (Pty) Ltd
P O Box 38766
Booysens
2016

INTRODUCTION

In order to comply with the Occupational Health and Safety Act, it is imperative to have the necessary notices, danger and warning signs installed on City Power's distribution networks.

1 SCOPE

This specification covers the design content of notices, warning and danger signs displayed on the City Power's distribution network.

2 NORMATIVE REFERENCES

The following documents contain provisions that through reference in the text constitute requirements of this specification. At the time of publication the editions indicated were valid. All standards and specifications are subject to revision. and parties to agreements based on this specification are encouraged to investigate the possibility of applying the most recent editions of the documents listed below.

Occupational Health and Safety Act 85 of 1993.
SANS 10140: Identification Colour Marking
SANS 1091: National Colour Standards
SANS 1186: Standard Signs and General Requirements
SANS 3668: Paints and Varnishes-Visual Comparison of the Colour Paints
SANS 7724: Paints and Varnishes

3 TYPES

Six types of notices, warning and danger signs are specified in this standard, for use on the Distribution network.

a) Sign 1 Low voltage enclosures.
b) Sign 2 Medium voltage chambers and enclosures
c) Sign 3 Procedure in case of fire.
d) Sign 4 Perform first aid and resuscitate a person suffering from the effects of electric shock.
e) Sign 5 Prohibit unauthorized persons from entering and interfering with electrical apparatus
f) Sign 6 Flooding by OC (pepper) gas SPECIFICATION FOR NOTICES, DANGER AND WARNING SIGNS

6.2 Packing

Only signs of the same type designation, material and size shall be packed together. The front of each sign shall be covered with a suitable material and the signs shall be so packed as to ensure that they are not damaged during normal handling, transportation and storage.

6.3 Documentation

6.3.1 Documentation shall be submitted in a technical catalogue format.
6.3.2 The technical catalogue shall specify the dimensions, reference numbers, and if applicable the complete range of other products and accessories available.

7 QUALITY MANAGEMENT

A quality management plan shall be set up in order to assure the proper quality management of the notice, danger and warning signs during design, development, production, installation and servicing

phases. Guidance on the requirements for a quality management plan may be found in the SANS ISO 9001. The details shall be subject to agreement between City Power and the Supplier. 8 ENVIRONMENTAL MANAGEMENT An environmental management plan shall be set up in order to assure the proper environmental management of the notice, danger and warning signs throughout their entire life cycles (i.e. during design, development, production, installation, operation and maintenance, decommissioning and disposal phases). Guidance on the requirements for an environmental management system may be found in SANS ISO 14001 standards. The details shall be subject to agreement between City Power and the Supplier. This is to ensure that the asset created conforms to environmental standards and City Power’s SHEQ Policy. SPECIFICATION FOR NOTICES, DANGER AND WARNING SIGNS REFERENCE REV CP_TSSPEC_078 1 PAGE 7 OF 21 Annex A - Bibliography None SPECIFICATION FOR NOTICES, DANGER AND WARNING SIGNS REFERENCE REV CP_TSSPEC_078 1 PAGE 8 OF 21 Annex B - Revision information DATE REV. NO. NOTES Aug. 2003 0 First issue May 2010 1 Second issue Changes on number 6 the material to be used Changed specification to accommodate the new drawings Added quality and environmental management SPECIFICATION FOR NOTICES, DANGER AND WARNING SIGNS REFERENCE REV CP_TSSPEC_078 1 PAGE 9 OF 21 Annex C - Item No. 1 – Sign 1 – SAP NO. 567 Schedule A: Purchaser's specific requirements Schedule B: Guarantees and technical particulars of equipment offered Item Subclause of CP_TSSPEC_078 Description Schedule A Schedule B 1 Quantity of signs required 2 2 Do the signs comply with SANS 1186? Required 3 2 Do the colours comply with SANS 1091? Required 4 4 Do the signs comply with the drawings? Required 5 5 Does the material for the signs comply? Required		

6 6 Is City Power’s SAP number on
the packaging? Required
Tender Number: ____
Tenderer’s Authorised Signatory: ____
Name in block letters Signature
Full name of company: ____
SPECIFICATION FOR NOTICES, DANGER
AND WARNING SIGNS
REFERENCE REV
CP_TSSPEC_078 1
PAGE 10 OF 21
Deviation schedule - Item No. 1 – Sign 1 – SAP NO. 567

Any deviations offered to this specification shall be listed below with reasons for deviation.

In addition. evidence shall be provided that the proposed deviation will at least be more cost-
effective than that specified by City Power.

Item Subclause of
CP_TSSPEC_078
Proposed deviation
Tender Number: ____
Tenderer’s Authorised Signatory: _______________________________ _________________
Name in block letters Signature
Full name of company: ____
SPECIFICATION FOR NOTICES, DANGER
AND WARNING SIGNS
REFERENCE REV
CP_TSSPEC_078 1
PAGE 11 OF 21
Annex C - Item No. 2 – Sign 2 – SAP NO. 568
Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered
Item Subclause of
CP_TSSPEC_078
Description Schedule A Schedule B
1 Quantity of signs required
2 2 Do the signs comply with SANS
1186? Required
3 2 Do the colours comply with
SANS 1091? Required
4 4 Do the signs comply with the
drawings? Required
5 5 Does the material for the signs
comply? Required
6 6 Is City Power’s SAP number on
the packaging? Required
Tender Number: ____
Tenderer’s Authorised Signatory: ____
Name in block letters Signature
Full name of company: ____
SPECIFICATION FOR NOTICES, DANGER
AND WARNING SIGNS
REFERENCE REV
CP_TSSPEC_078 1
PAGE 12 OF 21
Deviation schedule - Item No. 2 – Sign 2 – SAP NO. 568

Any deviations offered to this specification shall be listed below with reasons for deviation.

In addition. evidence shall be provided that the proposed deviation will at least be more cost-

effective than that specified by City Power.
Item Subclause of
CP_TSSPEC_078
Proposed deviation
Tender Number: ____
Tenderer's Authorised Signatory: _______________________________ _________________
Name in block letters Signature
Full name of company: ____
SPECIFICATION FOR NOTICES, DANGER
AND WARNING SIGNS
REFERENCE REV
CP_TSSPEC_078 1
PAGE 13 OF 21
Annex C - Item No. 3 – Sign 3 – SAP NO. 6232
Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered
Item Subclause of
CP_TSSPEC_078
Description Schedule A Schedule B
1 Quantity of signs required
2 2 Do the signs comply with SANS
1186? Required
3 2 Do the colours comply with
SANS 1091? Required
4 4 Do the signs comply with the
drawings? Required
5 5 Does the material for the signs
comply? Required
6 6 Is City Power's SAP number on
the packaging? Required
Tender Number: ____
Tenderer's Authorised Signatory: ____
Name in block letters Signature
Full name of company: _______________________ SPECIFICATION FOR STATION
CLASS,
METAL-OXIDE SURGE ARRESTORS
REFERENCE REV
CP_TSSPEC_117 2
PAGE 7 OF 24
Annexure A – Bibliography
None
SPECIFICATION FOR STATION CLASS,
METAL-OXIDE SURGE ARRESTORS
REFERENCE REV
CP_TSSPEC_117 2
PAGE 8 OF 24
Annexure B - Revision information
DATE REV. NO. NOTES
September 2004 0 First issue
September 2006 1 Inclusion of 132 kV station, metal-oxide surge arrestors
without spark-gaps
Changed SABS documents to related SANS documents
(Nominal references)
Changed document font sizes and spacing to required sizes
Added Annex A and B
Additional information on quality assurance and environmental
management
Renaming the document
October 2011 2 Logo's and title – Updated
Normative References – Included additional standards

Requirements – Edited and Updated
Test – Edited
Transportation, Storage and Installation – Included
Training – Edited
Quality Management – Included
Environmental Management – Included
Technical schedules – Inclusion of 11kV surge arrestors
Technical schedule – Edited 88kV and 132kV
Inclusion note in technical schedules
SPECIFICATION FOR STATION CLASS,
METAL-OXIDE SURGE ARRESTORS
REFERENCE REV
CP_TSSPEC_117 2
PAGE 9 OF 24
Annexure C – Technical schedules A and B for 11kV Station Class Surge Arrestors
Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered
Item
Sub-
clause
CP_TSS
PEC_117
Description Schedule A Schedule B
1 Surge arrestor identification
a) OEM XXXX
b) Country XXXX
2 Site conditions
a) Altitude m 1800
b) Maximum, weighted average, ambient temperature °C 40
c) Minimum, weighted average, ambient temperature °C -10
d) Maximum diurnal variation °C 30
e) Intensity of solar radiation kW/m² 1,1
f) IEC pollution level Very Heavy
g) Live spray washing No
a) Expected life of arrestor at and MCOV yrs 25
3 Electrical conditions
a) Maximum system voltage (Um) kV 12
b) Nominal system voltage (Un) kV 11
c) Supply frequency Hz 50
d) BIL of equipment to be protected kV 95
e) System earthing Effective
Note: Ticks [√, X], Asterisk [*], Word [Noted] or TBA [‘‘to be advice”] will not be accepted.
Tender Number: ____
Tenderer’s Authorised Signatory: _______________________ _________________________
Name in block letters Signature
Full name of company: ____
SPECIFICATION FOR STATION CLASS,
METAL-OXIDE SURGE ARRESTORS
REFERENCE REV
CP_TSSPEC_117 2
PAGE 10 OF 24
Item
Sub-
clause
CP_TSS
PEC_117

Description Schedule A Schedule B
4 Electrical characteristics of arrestor
a) Arrestor classification Station class
b) Discharge class 2
c) Maximum nominal discharge current In kA 10
d) Residual voltage at discharge current at 10kA
(8/20µs) kV 34
e) Maximum energy absorption capacity kJ/kVr 4.4
f) Arrestor rated voltage (Ur) kV 12
g) Maximum continuous operating voltage
(MCOV) (Uc) kV 9.6
h) Creepage distance mm/kV 31
5 Insulation withstand
a) Lightning impulse (1,2/50 µs) withstand level
(Housing insulation) kV ≥144
b) Power frequency withstand voltage 1.min (wet
condition) kV ≥67
6 Arrestor characteristic data required
a) V-I characteristic curve at temperature ranging
from 20 °C to 100 °C Yes
b) D.C voltage-current curves Yes
c) Temporary over voltage withstand capability
curve in per unit of MCOV number with and
without prior duty
Yes
7 Arrestor temporary over voltage capability,
with prior duty (prior duty as defined in annex D,
IEC 60099-4)
a) Over voltage applied for 1 s kV XXXX
b) Over voltage applied for 5 s kV XXXX
c) Over voltage applied for 10 s kV XXXX
Note: Ticks [√, X], Asterisk [*], Word [Noted] or TBA [‘‘to be advice”] will not be accepted.
Tender Number: ____
Tenderer’s Authorised Signatory: _________________________ ___________________________
Name in block letters Signature
Full name of company: ____
SPECIFICATION FOR STATION CLASS,
METAL-OXIDE SURGE ARRESTORS
REFERENCE REV
CP_TSSPEC_117 2
PAGE 11 OF 24
Item
Sub-
clause
CP_TSS
PEC_117
Description Schedule A Schedule B
8 Physical dimensions of arrestors
a) Overall height of arrestor mm XXXX
b) Minimum external flashover distance mm XXXX
c) External diameter of arrestor housing mm XXXX
9 Housing
a) Housing material: Silicone
Rubber
b) Arrestor earth terminal XXXX
b) Colour of housing Grey
10 MOV elements
a) Diameter of elements mm XXXX
b) Thickness of elements mm XXXX

c) Number of elements per arrestor XXXX
11 Arrestor mounting details
a) Orientation Vertical
b) Method of mounting (≥3 mounting holes) Base
c) Diameter of mounting holes in base mm XXXX
d) PCD mm XXXX
e) Supplied with 3 bolts, 3 nuts, 3 tapered washers
and 6 flat washers Yes/No Yes
12 Arrestor line terminal XXXXX
a) Type
Flat
terminal
/Stud
b) Minimum length mm XXXX
c) Diameter or Dimension mm XXXX
d) Orientation Vertical
e) Material Stainless
steel
Note: Ticks [√, X], Asterisk [*], Word [Noted] or TBA [‘‘to be advice”] will not be accepted.
Tender Number: ____
Tenderer’s Authorised Signatory: _________________________ ___________________________
Name in block letters Signature
Full name of company: ____
SPECIFICATION FOR STATION CLASS,
METAL-OXIDE SURGE ARRESTORS
REFERENCE REV
CP_TSSPEC_117 2
PAGE 12 OF 24
Item
Sub-
clause
CP_TSSP
EC_117
Description Schedule A Schedule B
13 Miscellaneous
a) Sample for inspection Required
b) Total mass of assembled unit kg XXXX
c) Pressure relief capability provided XXXX
14 Loading
a) Maximum permissible service load kN XXXX
b) Specified short-term load SSL N XXXX
c) Specified long-term load SLL N XXXX
d) Weight Kg XXXX
15 Ageing test under operating voltage simulating
weather conditions. [according to IEC 61109]
Reference number of test report XXXXX
16 Partial discharge test
a) Power frequency voltage applied [1,05 x MCOV] kV 25
b) Maximum partial discharge pC ≤ 5
18 Seal leakage test
Reference number of test report
19 Drawings to be submitted
a) Outline dimensions of arrestor, fit as for service
required? Yes
b) Mounting details required Yes
c) Line and earth terminal, conductor clamping
arrangement required? Yes
ISO 9001 accreditation Yes/No Yes
ISO 14001 accreditation Yes/No Yes

Note: Ticks [√, X], Asterisk [*], Word [Noted] or TBA [‘‘to be advice”] will not be accepted. **Tender Number: ____** **Tenderer’s Authorised Signatory: ______________________ ________________________** **Name in block letters Signature** **Full name of company: ____** **SPECIFICATION FOR STATION CLASS,** **METAL-OXIDE SURGE ARRESTORS** **REFERENCE REV** **CP_TSSPEC_117 2** **PAGE 13 OF 24** **Technical schedule A and B for 11 kV Surge arrestors** **Deviation schedule** **Any deviations offered to this specification shall be listed below with reasons for deviation.** **In addition, evidence shall be provided that the proposed deviation will at least be more cost-** **effective than that specified by City Power.** **Item Sub-clause** **CP_TSSPEC_117 Proposed deviation** **Tender Number: ____** **Tenderer’s Authorised Signatory: ______________________ ________________________** **Name in block letters Signature** **Full name of company____** **SPECIFICATION FOR STATION CLASS,** **METAL-OXIDE SURGE ARRESTORS** **REFERENCE REV** **CP_TSSPEC_117 2** **PAGE 14 OF 24** **Annexure C – Technical schedules A and B for 88kV Station Class Surge Arrestors** **Schedule A: Purchaser's specific requirements** **Schedule B: Guarantees and technical particulars of equipment offered** **Item** **Sub-** **clause** **CP_TSS** **PEC_117** **Description Schedule A Schedule B** **1 Surge arrestor identification** **a) OEM XXXX** **b) Country XXXX** **2 Site conditions** **a) Altitude m 1800** **b) Maximum, weighted average, ambient** **temperature °C 40** **c) Minimum, weighted average, ambient** **temperature °C -10** **d) Maximum diurnal variation °C 30** **e) Intensity of solar radiation kW/m² 1,1** **f) IEC pollution level Very Heavy** **g) Live spray washing No** **h) Expected life of arrestor at and MCOV yrs 25** **3 Electrical conditions** **a) Maximum system voltage (Um) kV 100** **b) Nominal system voltage (Un) kV 88** **c) Supply frequency Hz 50** **d) BIL of equipment to be protect REFERENCE REVSPECIFICATION FOR PROTECTIVE SLEEVE** **FOR FIBRE OPTIC CABLES CP_TSSPEC_150 O**		

PAGE 10 OF 14
ANNEX C – Item 1 –SLEEVE FIBRE OPTIC 40 MM – SAP NO. 1172
Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered
Item Subclause of
CP_TSSPEC_150
Description Schedule A Schedule B
1 Manufacturer XXXX
2 3.1(a) Material of flexible sleeve HDPE
3 3.1(b) Colour Yellow
4 3.1(c) Pilot string or draw-wire supplied Yes/ No Yes
5 3.1(e) Outside diameter 40 mm 40 mm
6 3.1(g) End caps on both ends Yes/No Yes
7 3.2(a) Constructed of high quality
polymer Yes/ No Yes
8 3.2(d) Does the sleeve contain an ultra
slippery silicon bore Yes/ No Yes
9 3.6 Minimum bending radius of
sleeve 10d 10d
10 4.1 Is the sleeve impact resistant? Yes/ No Yes
11 4.2 Pressure rating of the sleeve bar 10 bar
12 4.3 Is the sleeve UV protected? Yes/ No Yes
13 5 Are end caps supplied? Yes/ No Yes
14 6 Breaking strain of the pilot rope kg 100
15 7 Does the markings on the sleeve
comply? Yes/ No Yes
16 8 Does the packaging comply? Yes/ No Yes
17 8.2 Are the ends sealed? Yes/ No Yes
Tender Number: ____
Tenderer's Authorised Signatory: ____
Name in block letters Signature
Full name of company: ____
REFERENCE REV
CP_TSSPEC_150 O
SPECIFICATION FOR 40 MM DIRECT
BURIAL PROTECTIVE SLEEVE FOR FIBRE
OPTIC CABLES PAGE 11 OF 14
Item 1 –SLEEVE FIBRE OPTIC 40 MM – SAP NO. 1172
Deviation schedule
Any deviations offered to this specification shall be listed below with reasons for deviation.
In addition, evidence shall be provided that the proposed deviation will at least be more cost-
effective than that specified by City Power.
Item Subclause of
CP_TSSPEC_150
Proposed deviation
Tender Number: ____
Tenderer's Authorised Signatory: ____
Name in block letters Signature
Full name of company: ____
REFERENCE REV
CP_TSSPEC_150 O
SPECIFICATION FOR 40 MM DIRECT
BURIAL PROTECTIVE SLEEVE FOR FIBRE
OPTIC CABLES PAGE 12 OF 14
ANNEX C – Item 2 –COUPLING COMPRESSION FIBRE OPTIC 40 MM –
SAP NO. 1173
Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered

Item Subclause of
CP_TSSPEC_150
Description Schedule A Schedule B
1 Manufacturer XXXX
2 Material of compression coupling XXXX
3 3.5 IP rating of compression
coupling
IP 66
4 3.5 Pressure rating bar 10
Tender Number: ____
Tenderer's Authorised Signatory: ____
Name in block letters Signature
Full name of company: ____
REFERENCE REV
CP_TSSPEC_150 O
SPECIFICATION FOR 40 MM DIRECT
BURIAL PROTECTIVE SLEEVE FOR FIBRE
OPTIC CABLES PAGE 13 OF 14
Item 2 –COUPLING COMPRESSION FIBRE OPTIC 40 MM – SAP NO. 1173
Deviation schedule
Any deviations offered to this specification shall be listed below with reasons for deviation.
In addition, evidence shall be provided that the proposed deviation will at least be more cost-
effective than that specified by City Power.
Item Subclause of
CP_TSSPEC_150
Proposed deviation
Tender Number: ____
Tenderer's Authorised Signatory: ____
Name in block letters Signature
Full name of company: ____
REFERENCE REV
CP_TSSPEC_150 O
SPECIFICATION FOR 40 MM DIRECT
BURIAL PROTECTIVE SLEEVE FOR FIBRE
OPTIC CABLES PAGE 14 OF 14
ANNEX D – Stock Items
Material Group : PIPE-DST
Item SAP No SAP Short Description SAP Long Description
1 1172 SLEEVE FIBRE OPTIC 40MM
YELLOW
SLEEVE. PROTECTIVE. FLEXIBLE, YELLOW. HIGH DENSITY
POLYETHYLENE, FOR DRAWING FIBRE OPTIC CABLE. SUPPLIED
AS COILS OF 300M IN LENGTH WITH AN OUTER DIAMETER OF
40MM. WITH PILOT STRING. FITTED WITH END CAPS. ITEM
SPECIFICATION NO. CP_TSSPEC_150
2 1173 COUPLING FIBRE OPTIC 40MM
COUPLING. COMPRESSION. 40MM FOR YELLOW HIGH DENSITY
POLYETHYLENE FIBRE OPTIC SLEEVE. ITEM SPECIFICATION NO.
CP_TSSPEC_150
TITLE:SPECIFICATION FOR 132 kV
CABLES – LUTZ PROJECT
REFERENCE REV
CP_TSSPEC_153 LUTZ1
DATE: DECEMBER 2015
PAGE: 1 OF 13
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2 NORMATIVE
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3 DEFINITIONS AND
ABBREVIATIONS 3
4
REQUIREMENTS 3
5
TESTS 4
6 MARKING, LABELING AND
PACKAGING 4
7
DOCUMENTATION 5
8 QUALITY
ASSURANCE 5
9 ENVIRONMENTAL
MANAGEMENT.. 5
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BIBLIOGRAPHY 6
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INFORMATION 8
ANNEX C - TECHNICAL SCHEDULES A &
B 9
ANNEX D - STOCK
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FOREWORD

This specification was prepared by the following Work Group members:

M. Magemba Technology Services
G. Kingston Technology Services
Z. Ngqwala Technology Services
Patrick O' Halloran Technology Services

The Work Group was appointed by the Distribution Study Committee, which, at the time of approval, comprised the following members:

M. Magemba (Chairperson) Technology Services
A. Mazibuko Capital Execution
Van Staden Public Lighting
Ndlovu Lenasia Area
Makoni Midrand Area
Moraka Technology Services

G. Jardine Planning Services
Mayimele Siemens
Raseruthe Planning Services
P. O' Halloran Technology Services
P. Netshisaulu Planning Services
S. Raseboka Technology Services
V. Rampersad Technology Services
G. Kingston Technology Services
Z. Ngqwala Technology Services
K. Colenso Reuven Area
F. Docrat Reuven Area
A. Spies Roodepoort Area
K. Hattingh Midrand Area
H. Williams Planning Services
J. McWilliam Hursthill Area
W. Harper Protection
M. Paravano Protection
M. Grobler Roodepoort Area
J. Kruger Reuven
G. Vrey SHEQ
F. Wouda Planning Services

Recommendations for corrections, additions or deletions should be addressed to the:

Technology Services Manager
City Power
Johannesburg (Pty) Ltd
P O Box 38766
Booysens
2016

SPECIFICATION FOR 88 kV CABLES REFERENCE
CP_TSSPEC_153
REV
1
13PAGE 3 OF

INTRODUCTION

The effect of a high voltage cable failure is generally severe in terms of customer outage as well as repair cost to City Power. It is therefore important to ensure that HV cables comply with the required specifications and are of acceptable quality. As this is difficult to manage within the present City Power business structures it has been decided that SANS and IEC support structures will be relied upon to manage compliance to specification as well as quality. The implication to suppliers is that City Power will only purchase cables that bear the relevant SANS and/or IEC mark, or that have been fully tested in accordance with the requirements of this specification and NRS 077.

1 SCOPE

This specification covers City Power's requirements for high voltage cables in accordance with NRS 077.

2 NORMATIVE REFERENCES

The following documents contain provisions that, through reference in the text, constitute requirements of this specification. At the time of publication, the editions indicated were valid. All standards and specifications are subject to revision, and parties to agreements based on this specification are encouraged to investigate the possibility of applying the most recent editions of the documents listed below.

NRS 077, XLPE-insulated cables and accessories for systems with nominal voltages of 44 kV, 66 kV, 88 kV and 132 kV.

3 DEFINITIONS AND ABBREVIATIONS

The definitions and abbreviations in NRS 077 shall apply to this specification.

4 REQUIREMENTS

4.1 General

The high-voltage cables shall be 50/88 kV typically operating at a voltage of 88 kV.

SPECIFICATION FOR 88 kV CABLES REFERENCE
CP_TSSPEC_153
REV
1
13PAG SPECIFICATION FOR 88 kV CABLES REFERENCE
CP_TSSPEC_153
REV
1
13PAGE 13 OF

DEVIATION SCHEDULE

Any deviations offered to this specification shall be listed below with reasons for deviation. In addition, evidence shall be provided that the proposed deviation will at least be more cost- effective than that specified by City Power.

Ite
m
N
Sub-clause of
NRS 077
Proposed deviation
Tender Number:
Tenderer’s Authorised Signatory:
Name in block letters Signature
Full name of company:

SPECIFICATION FOR 88 kV CABLES REFERENCE
CP_TSSPEC_153
REV
1
13PAGE 14 OF

ANNEX D - STOCK ITEMS

Material Group: CABLE HV

Item SAP No. SAP Short Description SAP Long Description

1 1162 CAB 132 XLPE 1C 1000 AL CSA CABLE 132 KV, 1000 MM SQ ALUMINIUM CONDUCTOR, SINGLE CORE, XLPE INSULATED, SCREENED, CORRUGATED SEAMLESS ALUMINIUM, WITH BLACK PE OUTER SHEATH. ITEM SPECIFICATION NO. CP_TSSPEC_153.

2 2172 CAB 132 XLPE 1C 800 CU CSA CABLE 132 KV, 800 MM SQ COPPER CONDUCTOR, SINGLE CORE, XLPE INSULATED, SCREENED, CORRUGATED SEAMLESS ALUMINIUM, WITH BLACK PE OUTER SHEATH. ITEM SPECIFICATION NO. CP_TSSPEC_153.

3 1802 CAB 132 XLPE 1C 400 CU CSA CABLE 132 KV, 400 MM SQ COPPER CONDUCTOR, SINGLE CORE, XLPE INSULATED, SCREENED, CORRUGATED SEAMLESS ALUMINIUM, WITH BLACK PE OUTER SHEATH. ITEM SPECIFICATION NO. CP_TSSPEC_153.

REFERENCE REV
TITLE SPECIFICATION FOR COPPER-CLAD STEEL CONDUCTOR CP_TSSPEC_202 0
DATE: May 2014
PAGE: 1 OF 12
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FOREWORD

This specification was prepared on behalf of the distribution study committee by the following work group members:

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INTRODUCTION

Copper is a preferred material for earthing systems due to favourable corrosion resistance and high conductivity as compared to alternative materials. Due to the relatively high scrap value and the accessibility of most earthing systems, there is a high risk of theft associated with these systems. It is clear that the risk of copper theft extends to all electrical installations in the City Power area of supply.

Alternative materials are recommended in this guideline that meet the technical requirements, yet possess essentially no scrap value, and as such should dramatically curb theft. Moreover, connections between the elements of the earthing system are recommended that will permit fusing temperature limits for the conductors and thus allow optimum conductor utilization. These connections also dramatically reduce maintenance requirements since the elements of the system are fused there is no connection interface susceptible to corrosion and loss of contact pressure.

1 SCOPE

This specification recommends theft deterrent materials, including conductors and connections that may be utilised in all electrical installations for the purpose of earthing.

2 NORMATIVE REFERENCES

The following standards and specifications contain provisions that, through reference in the text, constitute requirements of this specification. At the time of publication the editions indicated were valid. All standards and specification are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards and specification listed below.

IEEE 80 Guide for safety in AC substations grounding
NRS 102 Theft Deterrent Earthing Materials
ASTM B910 Specification for soft annealed copper clad steel wire
ASTM B193 Test Method for Resistivity of Electrical Conductor Materials
SANS 1063 Earth rods, couplers and connections
CP_TSSTAN_025 Standard for theft deterrent materials
CP_TSSPEC_056 Specification for Earth rods and couplers
CP_TSSPEC_055 Specification for an exothermic welding system

3 DEFINITIONS AND ABBREVIATIONS

The definitions and abbreviations in the above documents shall apply to this specification.

IACS International Annealed Copper Standard

4 REQUIREMENTS

4.1 General

4.1.1 Nothing in this specification shall lessen the obligations of the supplier. The supplier shall be fully responsible for the design and manufacture of the theft deterrent materials and their satisfactory performance in service. This specification shall be in accordance with IEEE 80 and NRS 102.

4.2 General recommendations for earthing materials

4.2.1 The following basic criteria are the required properties for earthing materials for the purposes of this specification:

a)Corrosion resistance
b)High Electrical Ampacity
c)Mechanical robustness

SPECIFICATION FOR COPPER-CLAD STEEL
CONDUCTOR
REFERENCE REV

d)Very limited scrap value

4.2.2 Most alternative materials exhibit clear deficiencies in one or more of the properties above rendering these materials unsuitable for long-term application in earthing systems, particularly where the materials are buried.

4.2.3 Steel conductors that have been electroplated with copper or “cladded” with copper foil have been proven locally and internationally and are considered to be the only long-term practicable solutions which meet all the necessary basic criteria.

4.3 The formula for currents and mechanical strength

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(
××
×
=
−
ao
mo
rrc
mm TK
TK
t
TCAP
AI ln
10 4
2
r
a
Where
I is the rms current in kA
Amm
2 is the conductor cross section in mm 2
T m is the maximum allowable temperature in o C.
T a is the ambient temperature in o
C (IEEE 80-2000, use 40 o
C)
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r
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)
)

||
(
(
a
1 in o
C
tc is the duration of current in s
r
a is the thermal coefficient of resistivity at reference temperature rT in Co
1
o
a is the thermal coefficient of resistivity at Co
0 in Co
1
r
r is the resistivity of the ground conductor at reference temperature rT in cm−Ω
m
TCAP is the thermal capacity per unit volume in J/cm 3 0
C

4.4 Annealed Copper clad steel conductors

4.4.1 Material: The wire shall consist of a core of homogenous open-hearth, electric-furnace, or basic-oxygen steel with a continuous outer cladding of copper thoroughly bonded to the core throughout. The copper clad steel shall be manufactured in accordance to ASTM B910. The bonding process shall be metallurgical. Copper-clad steel conductors are available in 21%, 30%, 40% and 70% of the conductivity [based on the International Annealed Copper Standard (IACS)] of copper. But for conductors used for earthing purposes the two required or appropriate conductivity values are 30% and 40% respectively.

4.4.2 Tensile strength and elongation: The copper-clad steel wire shall conform to the tensile strength requirements of Table1. The elongation shall be a minimum of 15% for all diameters.

4.4.3 Dimensions: The wire size range shall be from 0.643 mm to 5.827 mm diameter.

4.4.4 Adhesion and surface defects: The copper clad steel wire shall not reveal any seams, pits, slivers, or other imperfection of sufficient magnitude to indicate inherent defects or imperfections.

4.4.5Joints: The finished wire shall contain no joints or splices.

4.4.6Finish: The wire shall be free from copper discontinuities and all imperfections.

4.4.7Copper Thickness: The minimum copper thickness due to eccentricity shall not be less than the values shown in Table 1.

4.4.8Resistivity: The electrical resistivity at a temperature of 20°C shall not exceed the values prescribed in Table 1.

**Nominal Conductivity
[%IACS]**

Normal Density
[g/mm 3
]
Maximum Resistivity
at 20°C
[Ωmm 2
/m]
Minimum Conductivity
[%IACS]
30 8.15 0.0586 29.41
40 8024 (is this value
correct?) 8.24
0.0440 39.21
Table 1: Density and Resistivity at 20°C
Nominal Conductivity
[%IACS]
Minimum Tensile
Strength
[N/mm 2
]
Minimum Copper
Thickness
[% of Diameter]
Nominal Copper
Thickness
[% of Diameter]
30 310 3.0 7
40 276 5.0 9
Table 2: Tensile and Minimum Copper Thickness
SPECIFICATION FOR COPPER-CLAD STEEL
CONDUCTOR
REFERENCE REV
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PAGE 6 OF 12
Material Conductivity K for 3s fault Area (mm 2
) Copper
equivalent
Maximum
final
temperature
150°C 1 250°C 2 400°C 3 450°C 4 800°C 5
Stranded
annealed
copper wire
100% 13.3 10.2 8.41 8.06 6.69 (16,35,70,95) 6
Copper –
clad steel
wire
40% 19.9 15.3 12.60 12.10 9.99 (16,35,70,95)6
Copper –
clad steel
wire
30% 23 17.70 14.50 13.90 11.50 (16,35,70,95)6
Zinc coated
steel wire
8.5% 41.5 31.7 25.90 ** ** 16,35,70,95,120,150,185
****Temperature at which zinc coated (galvanised) steel is likely to be damaged.**
1 Maximum temperature for insulated conductors.
2 Copper may anneal at temperatures greater than 250°C.
3 Zinc coated (galvanised) steel melts at 418.5°C.

4 Maximum temperatures of brazen connections.
5 As steel fuses at 1300°C and copper fuses at 1083°C, if a conductor is exothermically welded at
both ends, 800°C is considered a reasonable maximum temperature.
6 In order to meet the conductivity of copper a larger area of copper – clad – What is the equivalent
for 70mm2 copper conduct
Table 3: Calculated K constants for a 3s fault time
SPECIFICATION FOR COPPER-CLAD STEEL
CONDUCTOR
REFERENCE REV
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4.5 Connection types
The connections between elements in an earthing system are normally the limiting factor in the utilization
of the earthing conductors. The following temperature limits are recommended for various common
connection types:
Connection type Maximum allowable temperature
o
C
Bolted 250
Crimped 450
1
Brazed 450
Exothermic 1084 2
NOTE 1 Refer to manufacturer's recommended temperature limit for crimped connections as this varies with the type. The
recommended value is to be used for high SPECIFICATION FOR PORTABLE
EARTHING EQUIPMENT
REFERENCE REV
CP_TSSPEC_108 3
PAGE 26 OF 31
TECHNICAL SCHEDULES A AND B
ITEM 7: EQUIPOTENTIAL EARTHING FOOT PLATES SAP 3564
DEVIATION SCHEDULE
Any deviations offered to this specification shall be listed below with reasons for deviation.
In addition, evidence shall be provided that the proposed deviation will at least be more cost-
effective than that specified by City Power.
Item Sub-clause of
CP_TSSPEC_108
Proposed deviation
Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA ["To Be Advice"] will not be accepted
Tender Number: ____
Tenderer's Authorised Signatory: ____
Name in block letters Signature
Full name of company: ____
SPECIFICATION FOR PORTABLE
EARTHING EQUIPMENT
REFERENCE REV
CP_TSSPEC_108 3
PAGE 27 OF 31
TECHNICAL SCHEDULES A AND B
ITEM 8: INTERSWITCH SWITCHGEAR INSERT SWITCH PLUG SAP 6165
Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered

Item Sub-clause of
CP_TSSPEC_108
Description Schedule A Schedule B
1 Name of manufacturer XXXX
2 Place of manufacture XXXX
3 Manufacturer’s identification reference XXXX
4 4.1.4 Specification to which portable earthing
gear complies
SANS 1934
& SANS
61230
5 4.1.9 System voltage suitability kV 6,6 to 12
6 4.1.8 Fault level withstand (1 second rating)
for complete breaking current
kA 14.4
7 4.1.5 Conductor material Stranded
copper
8 4.7.3 Conductor C.S.A. mm2 95
11 4.5.5 Earth clamp material Leaded
brass
12 4.7.2 Line clamp application Interswitch
B20
13 4.10.2 It shall be labelled with operating
instructions for closing
Yes
14 4.10.3 It shall have a 60 degree clockwise turn
locking position and push in to operate
Yes
15 N/A Line clamp range mm XXXX
16 6 Marking as per clause 6 Yes/No Yes
17 6 Packaging as per clause 6 Yes/No Yes
18 7 Is all the information requested in clause
7 supplied?
Yes/No Yes
Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA [“To Be Advice”] will
not be accepted
Tender Number: ____
Tenderer’s Authorised Signatory: ____
Name in block letters Signature
Full name of company: ____
SPECIFICATION FOR PORTABLE
EARTHING EQUIPMENT
REFERENCE REV
CP_TSSPEC_108 3
PAGE 28 OF 31
TECHNICAL SCHEDULES A AND B
ITEM 8: INTERSWITCH SWITCHGEAR INSERT SWITCH PLUG SAP 6165
DEVIATION SCHEDULE
Any deviations offered to this specification shall be listed below with reasons for
deviation.
In addition, evidence shall be provided that the proposed deviation will at least be
more cost-
effective than that specified by City Power.
Item Sub-clause of
CP_TSSPEC_108
Proposed deviation
Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA [“To Be Advice”] will
not be accepted
Tender Number: ____
Tenderer’s Authorised Signatory: ____

Name in block letters Signature
Full name of company: ____
SPECIFICATION FOR PORTABLE
EARTHING EQUIPMENT
REFERENCE REV
CP_TSSPEC_108 3
PAGE 29 OF 31
TECHNICAL SCHEDULES A AND B
ITEM 9: BRACKET: HORIZONTAL/VERTICAL MOUNTING SAP 349
Schedule A: Purchaser's specific requirements
Schedule B: Guarantees and technical particulars of equipment offered
Item Sub-clause of
CP_TSSPEC_108
Description Schedule A Schedule B
1 Name of manufacturer XXXX
2 Place of manufacture XXXX
3 Manufacturer's identification reference XXXX
4 Ideal for Inland areas Yes
5 Used for mounting Yes
6 Non-Ferrous Yes
Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA ["To Be Advice"] will not be accepted
Tender Number: ____
Tenderer's Authorised Signatory: ____
Name in block letters Signature
Full name of company: ____
SPECIFICATION FOR PORTABLE
EARTHING EQUIPMENT
REFERENCE REV
CP_TSSPEC_108 3
PAGE 30 OF 31
TECHNICAL SCHEDULES A AND B
ITEM 9: BRACKET: HORIZONTAL/VERTICAL MOUNTING SAP 349
DEVIATION SCHEDULE
Any deviations offered to this specification shall be listed below with reasons for deviation.
In addition, evidence shall be provided that the proposed deviation will at least be more cost-
effective than that specified by City Power.
Item Sub-clause of
CP_TSSPEC_108
Proposed deviation
Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA ["To Be Advice"] will not be accepted
Tender Number: ____
Tenderer's Authorised Signatory: ____
Name in block letters Signature
Full name of company: ____
SPECIFICATION FOR PORTABLE
EARTHING EQUIPMENT
REFERENCE REV
CP_TSSPEC_108 3
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ANNEXURE D – STOCK ITEMS
Material Group: ELECTRICAL ACCESSORIES
Item SAP No. SAP Short Description SAP Long Description
1 3551 PANEL PORTABLE EARTH
EQUIPMENT
PANEL PORTABLE EQUIPMENT FOR EARTHING OR EARTHING
AND SHORT CIRCUITING FOR PANELS SUITABLE FOR NOMINAL

VOLTAGES, 400V TO 33 KV. SPECIFICATION NO. CP_TSSPEC_108.

2 3561 OVERHEAD LINE PORTABLE EARTHING GEAR

OVERHEAD LINE PORTABLE EARTH GEAR FOR USE ON LV AND MV LINES, FOUR INTER-PHASE CONDUCTOR, WITH LENGTH OF 1.5 M EACH, AND SINGLE EARTHING CONDUCTOR OF 13 M LONG.

3 3562 HIGH VOLTAGE PORTABLE EARTHING GEAR

HIGH VOLTAGE EARTH EQUIPMENT, 6MM LONG, FOR USE ON SYSTEM VOLTAGES, 6.6 TO 132 KV FOR EARTHING AND SHORT CIRCUITING THREE PHASE DEVICES TO GROUND. SPECIFICATION CP_TSSPEC_108

4 6636 MAGNEFIX EARTHING KITS

PORTABLE MAGNEFIX EARTHING KITS, TO CONNECT ISOLATED APPARATUS DIRECTLY TO GROUND FOR SAFE DISCHARGE. CP_TSSPEC_108.

5 3565 INTERSWITCH EARTHING KITS

INTERSWITCH PORTABLE EARTHING KITS TO ISOLATE APPARATUS DIRECTLY TO GROUND TO ENSURE SAFE DISCHARGE OF ELECTRICAL ENERGY AT ALL TIMES.

| Eskom Research, Testing & Development102

The Flexible Grand Challenge

Partnerships and collaboration

- EPRI – Electricity Power Research Institute (EPRI) has been a key partner to supplement the research programme with skills and common research challenges facing the industry.
- University of Stellenbosch – Expert academic research group on power system flexibility and customer behavioural economics.
- GIZ – German development agency funding research programmes on renewable energy integration and flexible operations.
- Danish Energy Agency – Danish research programme building capacity and skills on renewable energy integration into the power system and flexible operations.
- University of Witwatersrand – Has a smart grid research group under the leadership of Prof Willie Cronje. This group consists of both key academics in both power and IT/ OT sectors and will help lead research topics that are industry driven.
- Cape Peninsula University Technology – Has a real-time digital simulator as well as cluster computing capabilities to model ad simulate flexibility impacts on the grid, as well as generator dispatching criteria.

The Research Framework

FLEXIBLE OPERATIONS WORK PLAN

Plant – all plant connected to grid Power Systems Market – Electricity supply industry

- Determine range for ramping Gx fleet
- Determine inertia, SCO and voltage control for ramping scenarios
- Define current base for flexibility
- Determine future of the Tx grid
- How do we strategically position the wirel business with a focus on the technical issues?

• Techno economic studies for minimum generation and beyond increasing ramping capabilities of stations • Investigate small modular cheap pump storage schemes • Investigation of PV response to system during thunderstorms and extreme events • Investigate the contribution of wind to inertia and fault ride through and determine the impact on the power system • Investigate the like hood of small PV inverters and functionalities on the power system • Investigate AGC at Sere wind farm • Investigate storage for the ancillary services to the grid • Map changes to system and related issues on grid • Includes South Africa and SADC • Investigates real time use of pricing and incentivising models • Investigate dynamic pricing models • Pilot and demo of energy storage on Dx and Tx lines and investigate costs deferment and power quality challenges • Investigate the locations of growth areas and growth rates of roof top PVs. Predict future market growth • Five to ten-year time frame • Identify what technologies are likely to be disruptive and anti		
5 2.0 Fundamentals of Systems EngineeringNASA SYSTEMS ENGINEERING HANDBOOK document, but an overview is given in the following subsections of this chapter. 2.1 The Common Technical Processes and the SE Engine There are three sets of common technical processes in NPR 7123.1, NASA Systems Engineering Processes and Requirements: system design, product realization, and technical management. The processes in each set and their interactions and flows are illustrated by the NPR systems engineering "engine" shown in FIGURE 2.1-1. The processes of the SE engine are used to develop and realize the end products. This chapter provides the application context of the 17 common technical processes required in NPR7123.1. The system design processes, the product realization processes, and the technical management processes are discussed in more detail in Chapters 4.0, 5.0, and 6.0, respectively. Processes 1 through 9 indicated in FIGURE 2.1-1 represent the tasks in the execution of a project. Processes 10 through17 are crosscutting tools for carrying out the processes. PROJECT MANAGEMENT PROJECT MANAGEMENT ACTIVITIES • Setting up Project Team • Programmatic Stakeholders (non-technical, non-business)		

- Programmatic Planning (non-technical, non-business)
- Identifying Programmatic (non-technical) requirements
- Identifying Programmatic Risks
- Technology Transfer and Commercialization
- Integration of technical and non-technical activities
- Overall Approver/Decider

Systems Engineering

System Design Processes

- Stakeholder Expectations Definition
- Technical Requirement’s Definition
- Logical Decomposition
- Design Solution Definition

Product Realization Processes

- Product Implementation
- Product Integration
- Product Verification
- Product Validation
- Product Transition

Technical Management Processes

- Technical Planning
- Requirements Management
- Interface Management
- Technical Risk Management
- Configuration Management
- Technical Data Management
- Technical Assessment
- Decision Analyses

PP&C

- PP&C Integration
- Resource Management
- Scheduling
- Cost Estimation & Assessment
- Acquisition & Contract Management
- Risk Management
- CM/DM

Common Areas

- Stakeholders
- Risks
- Configuration Management
- Data Management
- Reviews
- Schedule

FIGURE 2.0-1 SE in Context of Overall Project Management

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2.0 Fundamentals of Systems EngineeringNASA SYSTEMS ENGINEERING HANDBOOK

Requirements Definition Processes

1. Stakeholders Expectations Definition
2. Technical Requirements Definition
3. Logical Decomposition
4. Design Solution Definition

System Design Processes

**Requirements Flow Down
from Level above
Technical Management
Processes
10. Technical Planning
11. Requirement Management
12. Interface Management
13. Technical Risk Management
14. Configuration Management
15. Technical Data Management
16. Technical Assessment
Technical Decision
Analysis Process
17. Decision Analysis
9. Product Transition
8. Product Validation
7. Product Verification
6. Product Integration
5. Product Implementation
Product Realization
Processes
System Design Processes
applied to each product
layer down through system
structure
Product Realization
Processes applied to each
product layer up through
system structure
Requirements Flow Down
To Level below
Realized Products
to Level above
Realized Products
From Level below
Cross -
cutting
Cross-
cutting
Technical Solution
Definition Processes
Technical Planning
Processes
Technical Control
Processes
Product Transition
Processes
Evaluation Processes
Design Realization
ProcessesTechnical Assessment
Processes**

FIGURE 2.1-1 The Systems Engineering Engine (NPR 7123 1)

- **System Design Processes: The four system design processes shown in FIGURE 2.1-1 are used to define and baseline stakeholder expectations, generate and baseline technical requirements, decompose the requirements into logical and behavioral models, and convert the technical requirements into a design solution that will satisfy the baselined stakeholder expectations. These processes** are applied to each product of the system structure from the top of the structure to the bottom until the lowest products in any system structure branch are defined to the point where they can be built, bought, or reused. All other products in the system structure are realized by implementation or integration.

- Product Realization Processes: The product realization processes are applied to each operational/ mission product in the system structure starting from the lowest level product and working up to higher level integrated products. These processes are used to create the design solution for each product (through buying, coding, building, or reusing) and to verify, validate, and transition up to the next hierarchical level those products that satisfy their design solutions and meet stakeholder expectations as a function of the applicable life cycle phase.

7

2.0 Fundamentals of Systems EngineeringNASA SYSTEMS ENGINEERING HANDBOOK

- Technical Management Processes: The technical management processes are used to establish and evolve technical plans for the project, to manage communication across interfaces, to assess progress against the plans and requirements for the system products or services, to control technical execution of the project through to completion, and to aid in the decision-making process.

TABLE 2.1-1 Alignment of the 17 SE Processes to AS9100

SE Process AS9100 Requirement
Stakeholder Expectations Customer Requirements
Technical Requirements
Definition
Planning of Product Realization
Logical Decomposition Design and Development Input
Design Solution Definition Design and Development Output
Product Implementation Control of Production
Product Integration Control of Production
Product Verification Verification
Product Validation Validation
Product Transition Control of Work Transfers; Post Delivery Support, Preservation of Product
Technical Planning Planning of Product Realization; Review of Requirements; Measurement, Analysis and
Improvement
Requirements Management Design and Development Planning; Purchasing
Interface Management Configuration Management
Technical Risk Management Risk Management
Configuration Management Configuration Management; Identification and Traceability; Control of Nonconforming
Product
Technical Data Management Control of Documents; Control of Records; Control of Design and Development
Changes
Technical Assessment Design and Development Review
Decision Analysis Measurement, Analysis and Improvement; Analysis of Data

The processes within the SE engine are used both iteratively and recursively. As defined in NPR 7123.1,

"iterative" is the "application of a process to the same product or set of products to correct a discovered discrepancy or other variation from requirements," whereas "recursive" is defined as adding value to the system "by the repeated application of processes to design next lower layer system products or to realize next upper layer end products within the system structure. This also applies to repeating application of the same processes to the system structure in the next life cycle phase to mature the system definition and satisfy phase success criteria." The technical processes are applied recursively and iteratively to break down the initializing concepts of the system to a level of detail concrete enough that the technical team can implement a product from the information. Then the processes are applied recursively and iteratively to

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2.0 Fundamentals of Systems EngineeringNASA SYSTEMS ENGINEERING HANDBOOK

integrate the smallest product into greater and larger systems until the whole of the system or product has been assembled, verified, validated, and transitioned. For a detailed example of how the SE Engine could be used, refer to the NASA Expanded Guidance for SE document at https://nen.nasa.gov/web/se/doc-repository.

AS9100 is a widely adopted and standardized quality management system developed for the commercial aerospace industry. Some NASA Centers have chosen to certify to the AS9100 quality system and may require their contractors to follow NPR 7123.1. TABLE 2.1-1 shows how the 17 NASA SE processes align with AS9100.

2.2 An Overview of the SE Engine by Project Phase

FIGURE 2.2-1 conceptually illustrates how the SE engine is used during each phase of a project (Pre-Phase A through Phase F). The life cycle phases are described in TABLE 2.2-1. FIGURE 2.2-1 is a conceptual diagram. For full details, refer to the poster version of this figure, which is located at https://nen.nasa.gov/web/se/doc-repository.

Pre-Phase A:
Concept Studies
ImplementationApproval
Technical DevelopmentTechnical Management
5.2
Key Decision Points:
Major Reviews:
Feasible Concept Top-Level Architecture Functional Baseline Allocated Baseline As-Deployed Baseline
6.1
6.8
6.1
6.8
6.1
6.8
6.1
6.8
6.1

6.8
6.1
6.8
6.1
6.8
?
?
?
5.3
5.4
5.5
5.1
4.2
4.1
4.3
4.4
?
?
?
?
?
?
?
4.2
4.1
4.3
4.4
5.1
5.3
5.4
5.5
5.2
Product
Baseline
Phase F:
Closeout
Phase E:
Operations &
Sustainment
Phase D:
System Assembly,
Integration & Test, Launch
Phase B:
Preliminary Design &
Technology Completion
Phase A:
Concept & Technology
Development
Phase C:
Final Design &
Fabrication
6.2
6.7
6.6
6.5
6.4
6.3
Formulation

FIGURE 2.2-1 Miniature Version of the Poster-Size NASA Project Life Cycle Process Flow for Flight and Ground Systems Accompanying this Handbook

The uppermost horizontal portion of this chart is used as a reference to project system maturity, as the project progresses from a feasible concept to an as-deployed system; phase activities; Key Decision Points (KDPs); and major project reviews. The next major horizontal band shows the technical development processes (steps 1 through 9) in each project phase. The SE engine cycles five times from Pre-Phase A through Phase D. Note that NASA's management has structured Phases C and D to "split" the technical development processes in half in Phases C and D to ensure closer management control. The engine is bound by a dashed line in Phases C and D. Once a project enters into its operational state (Phase E) and closes out (Phase F), the technical work shifts to activities commensurate with these last two project phases. The next major horizontal band shows the eight technical management processes (steps 10 through 17) in each project phase. The SE engine cycles the technical management processes seven times from Pre-Phase A through Phase F.

TABLE 2.2-1 Project Life Cycle Phases

Phase	Purpose	Typical Outcomes
Pre-Formulation Pre-Phase A Concept Studies	To produce a broad spectrum of ideas and alternatives for missions from which new programs/projects can be selected. Determine feasibility of desired system, develop mission concepts, draft system-level requirements, assess performance, cost, and schedule feasibility; identify potential technology needs, and scope.	Feasible system concepts in the form of simulations, analysis, study reports, models, and mock-ups
Formulation Phase A Concept and Technology Development	To determine the feasibility and desirability of a suggested new system and establish an initial baseline compatibility with NASA's strategic plans. Develop final mission concept, system-level requirements, needed system technology developments, and program/project technical management plans.	System concept definition in the form of simulations, analysis, engineering models and mock-ups, and trade study definition
Phase B Preliminary Design and Technology Completion		

To define the project in enough detail to establish an initial baseline capable of meeting mission needs. Develop system structure end product (and enabling product) requirements and generate a preliminary design for each system structure end product.

End products in the form of mock-ups, trade study results, specification and interface documents, and prototypes

Implementation

Phase C

Final Design and Fabrication

To complete the detailed design of the system (and its associated subsystems, including its operations systems), fabricate hardware, and code software. Generate final designs for each system structure end product.

End product detailed designs, end product component fabrication, and software development

Phase D

System Assembly, Integration and Test, Launch

To assemble and integrate the system (hardware, software, and humans), meanwhile developing confidence that it is able to meet the system requirements. Launch and prepare for operations. Perform system end product implementation, assembly, integration and test, and transition to use.

Operations-ready system end product with supporting related enabling products

Phase E

Operations and Sustainment

To conduct the mission and meet the initially identified need and maintain support for that need. Implement the mission operations plan.

Desired system

Phase F

Closeout

To implement the systems decommissioning/disposal plan developed in Phase E and perform analyses of the returned data and any returned samples.

Product closeout

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2.0 Fundamentals of Systems EngineeringNASA SYSTEMS ENGINEERING HANDBOOK

2.3 Example of Using the SE Engine

In Pre-Phase A, the SE engine is used to develop the initial concepts; clearly define the unique roles of humans, hardware, and software in performing the missions objectives; establish the system functional and performance boundaries; develop/identify a preliminary/draft set of key high-level requirements, define one or more initial Concept of Operations (ConOps) scenarios; realize these concepts through iterative modeling, mock-ups, simulation, or other means; and verify and validate that these concepts

and products would be able to meet the key high-level requirements and ConOps. The operational concept must include scenarios for all significant operational situations, including known off-nominal situations. To develop a useful and complete set of scenarios, important malfunctions and degraded-mode operational situations must be considered. The importance of early ConOps development cannot be underestimated. As system requirements become more detailed and contain more complex technical information, it becomes harder for the stakeholders and users to understand what the requirements are conveying; i.e., it may become more difficult to visualize the end product. The ConOps can serve as a check in identifying missing or conflicting requirements. Note that this Pre-Phase A initial concepts development work is not the formal verification and validation program that is performed on the final product, but rather it is a methodical run through ensuring that the concepts that are being developed in this Pre-Phase A are able to meet the likely requirements and expectations of the stakeholders. Concepts are developed to the lowest level necessary to ensure that they are feasible and to a level that reduces the risk low enough to satisfy the project. Academically, this process could proceed down to the circuit board level for every system; however, that would involve a great deal of time and money. There may be a higher level or tier of product than circuit board level that would enable designers to accurately determine the feasibility of accomplishing the project, which is the purpose of Pre-Phase A. During Phase A, the recursive use of the SE engine is continued, this time taking the concepts and draft key requir		
mpetency Area **Competency Description** **SE 1.0** **System Design** **SE 1.1** **Stakeholder Expectation Definition & Management** **Eliciting and defining use cases, scenarios, concept of operations and stakeholder expectations. This includes identifying stakeholders, establishing support strategies, establishing a set of Measures of Effectiveness (MOEs), validating stakeholder expectation statements, and obtaining commitments from the customer and other stakeholders, as well as using the baselined stakeholder expectations for product validation during product realization** **SE 1.2** **Technical Requirements Definition** **Transforming the baseline stakeholder expectations into unique, quantitative, and**		

measurable technical requirements expressed as “shall” statements that can be used for defining the design solution. This includes analyzing the scope of the technical problems to be solved, defining constraints affecting the designs, defining the performance requirements, validating the resulting technical requirement statements, defining the Measures of Performance (MOPs) for each MOE, and defining appropriate Technical Performance Measures (TPMs) by which technical progress will be assessed. **SE 1.3** **Logical** **Decomposition** **Transforming the defined set of technical requirements into a set of logical decomposition models and their associated set of derived technical requirements for lower levels of the system, and for input to the design solution efforts. This includes decomposing and analyzing by function, time, behavior, data flow, object, and other models. It also includes allocating requirements to these decomposition models, resolving conflicts between derived requirements as revealed by the models, defining a system architecture for establishing the levels of allocation, and validating the derived technical requirements.** **SE 1.4** **Design** **Solution** **Definition** **Translating the decomposition models and derived requirements into one or more design solutions, and using the Decision Analysis process to analyze each alternative and for selecting a preferred alternative that will satisfy the technical requirements.** **A full technical data package is developed describing the selected solution. This includes generating a full design description for the selected solution; developing a set of ‘make-to,’ ‘buy-to,’ ‘reuse-to,’ specifications; and initiating the development or acquisition of system products and enabling products.** **SE 2.0** **Product** **Realization** **SE 2.1** **Product** **Implementation** **Generating a specific product through buying, making, or reusing so as to satisfy the design requirements. This includes preparing the implementation strategy; building or coding the produce; reviewing vendor technical information; inspecting delivered, built, or reused products; and preparing product support documentation for integration.** **SE 2.2** **Product** **Integration** **Assembling and integrating lower-level validated end products into the desired end product of the higher-level product. This includes preparing the product integration strategy, performing detailed planning, obtaining products to integrate, confirming**		

that the products are ready for integration, preparing the integration environment,
and preparing product support documentation.
SE 2.3
Product
Verification
Proving the end product conforms to its requirements. This includes preparing for
the verification efforts, analyzing the outcomes of verification (including identifying
anomalies and establishing recommended corrective actions), and preparing a
product verification report providing the evidence of product conformance with the
applicable requirements.
(continued)
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2.0 Fundamentals of Systems EngineeringNASA SYSTEMS ENGINEERING HANDBOOK
Competency
Area
Competency Description
SE 2.0
Product
Realization
SE 2.4
Product
Validation
Confirming that a verified end product satisfies the stakeholder expectations for
its intended use when placed in its intended 207NASA SYSTEMS ENGINEERING HANDBOOK
Appendix G: Technology Assessment/Insertion

A number of processes can be used to develop the appropriate level of understanding required for successful technology insertion. The intent of this appendix is to describe a systematic process that can be used as an example of how to apply standard systems engineering practices to perform a comprehensive Technology Assessment (TA). The TA comprises two parts, a Technology Maturity Assessment (TMA) and an Advancement Degree of Difficulty Assessment (AD2). The process begins with the TMA which is used to determine technological maturity via NASA’s Technology Readiness Level (TRL) scale. It then proceeds to develop an understanding of what is required to advance the level of maturity through the AD2. It is necessary to conduct TAs at various stages throughout a program/project to provide the Key Decision Point (KDP) products required for transition between phases. (See TABLE G.1-1.)

The initial TMA provides the baseline maturity of the system’s required technologies at program/project outset and allows monitoring progress throughout development. The final TMA is performed just prior to the Preliminary Design Review (PDR). It forms the basis for the Technology Readiness Assessment Report (TRAR), which documents the maturity of the technological advancement required by the systems, subsystems, and components demonstrated through test and analysis. The initial AD2 provides the material necessary to develop preliminary cost and to

schedule plans and preliminary risk assessments. In subsequent assessments, the information is used to build the Technology Development Plan and in the process, identify alternative paths, fallback positions, and performance descope options. The information is also vital to preparing milestones and metrics for subsequent Earned Value Management (EVM).

The TMA is performed against the hierarchical breakdown of the hardware and software products of the program/project PBS to achieve a systematic, overall understanding at the system, subsystem, and component levels. (See FIGURE G.1-1.)

TABLE G.1-1 Products Provided by the TA as a Function of Program/Project Phase

Gate Product

KDP A: Transition from Requires an assessment of potential technology needs versus current and planned
Pre-Phase A to Phase A technology readiness levels, as well as potential opportunities to use commercial,
academic, and other government agency sources of technology. Included as part of
the draft integrated baseline. Technology Development Plan is baselined that identifies
technologies to be developed, heritage systems to be modified, alternative paths to be
pursued, fallback positions and corresponding performance descopes, milestones, metrics,
and key decision points. Initial Technology Readiness Assessment (TRA) is available.
KDP B: Transition from Technology Development Plan and Technology Readiness Assessment (TRA) are updated.
Phase A to Phase B Incorporated in the preliminary project plan.
KDP C: Transition from Requires a TRAR demonstrating that all systems, subsystems, and components have
Phase B to Phase C/D achieved a level of technological maturity with demonstrated evidence of qualification in a
relevant environment.

Source: NPR 7120 5

G.2 Inputs/Entry Criteria

It is extremely important that a TA process be defined at the beginning of the program/project and that it be performed at the earliest possible stage (concept development) and throughout the program/project through PDR. Inputs to the process will vary in level of detail according to the phase of the program/project, and even though there is a lack of detail in Pre-Phase A, the TA will drive out the major critical

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Appendix G: Technology Assessment/Insertion

technological advancements required. Therefore, at the beginning of Pre-Phase A, the following should be provided:

- Refinement of TRL definitions.
- Definition of AD2.
- Definition of terms to be used in the assessment process.
- Establishment of meaningful evaluation criteria and metrics that will allow for clear identification of gaps and shortfalls in performance.
- Establishment of the TA team.
- Establishment of an independent TA review team.

.1: Integ MPS .2: LH System .3: O2 Fluid Sys. .4: Pressure & Pneumatic Sys. .5: Umbilicals & Disconnect Crew Launch Vehicle 1.3 Launch Vehicle 1.3.8 First Stage 1.3.8.1 Upper Stage 1.3.8.2 Upper Stage Engine 1.3.8.3 … MPS 1.3.8.2.4 … US RCS 1.3.8.2.5 FS RCS 1.3.8.2.6 TVCS 1.3.8.2.7 Avionics 1.3.8.2.8 Software 1.3.8.2.9 … Integrated Test H/W 1.3.8.2.10 … .1: Integ RCS .2: Integ Energy Support .1: Integ RCS .1: Integ TVCS .2: Actuator .3: Hydraulic Power .4: APU . 1: Integ Avionics .2: C&DH System .3: GN&C H/W .4: Radio Frequency System .5: EPS .6: Electrical Integration .7: Develop Flight Instrument .8: Sensor & Instrument System .9: EGSE .10: Integ CLV Avionics System Element Testing .11: Flight Safety System		

.1: Integ S/W
System
.2: Flight S/W
. 1: MPTA
.2: GVT
.3: STA
.4: US for DTF-1
.5: US for VTF-2
.6: US for RRF-3
.7: Struc. Thermal
Component Test

FIGURE G.1-1 PBS Example

G.3 How to Do Technology Assessment

The technology assessment process makes use of basic systems engineering principles and processes. As mentioned previously, it is structured to occur within the framework of the Product Breakdown Structure (PBS) to facilitate incorporation of the results. Using the PBS as a framework has a twofold benefit—it breaks the “problem” down into systems, subsystems, and components that can be more accurately assessed; and it provides the results of the assessment in a format that can be readily used in the generation

of program costs and schedules. It can also be highly beneficial in providing milestones and metrics for progress tracking using EVM. As discussed above, it is a two-step process comprised of (1) the determination of the current technological maturity in terms of TRLs and (2) the determination of the difficulty associated with moving a technology from one TRL to the next through the use of the AD2.

Conceptual Level Activities

The overall process is iterative, starting at the conceptual level during program Formulation, establishing the initial identification of critical technologies, and establishing the preliminary cost, schedule, and risk mitigation plans. Continuing on into Phase A, the process is used to establish the baseline maturity, the Technology Development Plan, and the associated costs and schedule. The final TA consists only of the TMA and is used to develop the TRAR, which validates that all elements are at the requisite maturity level. (See FIGURE G.3-1.)

Identify systems, sub-
systems, and components
per hierarchical product
breakdown of the WBS
Assign TRL to subsystems
based on lowest TRL of
components and TRL
state of integration
Assign TRL to all
components based on
assessment of maturity
Assign TRL to systems
based on lowest TRL of
subsystems and TRL

state of integration
Identify all components, subsystems, and systems that are at lower TRLs than required by program
Baseline technology maturity assessment
Perform AD2 on all components, subsystems, and systems that are below requisite maturity level
Technology Development Plan
Cost Plan
Schedule Plan
Risk Assessment

FIGURE G.3-1 Technology Assessment Process

Even at the conceptual level, it is important to use the formalism of a PBS to avoid allowing important technologies to slip through the cracks. Because of the preliminary nature of the concept, the systems, subsystems, and components will be defined at a level that will not permit detailed assessments to be made. The process of performing the assessment, however, is the same as that used for subsequent, more detailed steps that occur later in the program/project where systems are defined in greater detail.

Architectural Studies

Once the concept has been formulated and the initial identification of critical technologies made, it is

necessary to perform detailed architecture studies with the Technology Assessment Process intimately interwoven. (See FIGURE G.3-2.)

Requirements
TRL/AD2 Assessment
Architectural Studies
Technology Maturation
Concepts System Design

FIGURE G.3-2 Architectural Studies and Technology Development

The purpose of the architecture studies is to refine end-item system design to meet the overall scientific requirements of the mission. It is imperative that there be a continuous relationship between architectural studies and maturing technology advances. The architectural studies should incorporate the results of the technology maturation, planning for alternative paths and identifying new areas required for development as the architecture is refined. Similarly, it is incumbent upon the technology maturation process to identify requirements that are not feasible and development routes that are not fruitful and to transmit that information to the architecture studies in a timely manner. It is also incumbent upon the architecture studies to provide feedback to the technology development process relative to changes in requirements. Particular attention should be given to “heritage” systems in that they are often used in architectures and environments different from those in which they were designed to operate.

G.4 Establishing TRLs

A Technology Readiness Level (TRL) is, at its most basic, a description of the performance history of a given system, subsystem, or component relative to a set of levels first described at NASA HQ in the 1980s. The TRL essentially describes the state of a given technology and provides a baseline from which maturity is gauged and advancement defined. (See FIGURE G.4-1.)

Programs are often undertaken without fully understanding either the maturity of key technologies or what is needed to develop them to the required level. It is impossible to understand the magnitude and scope of a development program without having a clear understanding of the baseline technological maturity of all elements of the system. Establishing the TRL is a vital first step on the way to a successful program. A frequent misconception is that in practice, it is too difficult to determine TRLs and that when you do, it is not meaningful. On the contrary, identifying TRLs can be a straightforward systems engineering process of determining what was demonstrated and under what conditions it was demonstrated.

Terminology

At first glance, the TRL descriptions in FIGURE G.4-1 appear to be straightforward. It is in the process of trying to assign levels that problems arise. A primary cause of difficulty is in terminology; e.g., everyone knows what a breadboard is, but not everyone has the same definition. Also, what is a “relevant environment?” What is relevant to one application may or may not be relevant to another. Many of these terms originated in various branches of engineering and had, at the time, very specific meanings to that particular field. They have since become commonly used throughout the engineering field and often acquire differences in meaning from discipline to discipline, some differences subtle, some not so subtle. “Breadboard,” for example, comes from electrical engineering where the original use referred to checking out the functienvironment and ensuring that any anomalies discovered during validation are appropriately resolved prior to product transition. This includes preparing to conduct product validation, performing the product validation, analyzing the results of validation (including identifying anomalies and establishing recommended corrective actions), and preparing a product validation report providing the evidence of product conformance with the stakeholder expectations baseline.

SE 2.5

Product Transition

Transitioning the verified and validated product to the customer at the next level in the system structure. This includes preparing to conduct product transition, evaluating the product and enabling product readiness for product transition, preparing the product for transition (including handling, storing, and shipping preparation), preparing sites, and generating required documentation to

accompany the product **SE 3.0** **Technical Management** **SE 3.1** **Technical Planning** **Planning for the application and management of each common technical process, as well as identifying, defining, and planning the technical effort necessary to meet project objectives. This includes preparing or updating a planning strategy for each of the technical processes, and determining deliverable work products from technical efforts; identifying technical reporting requirements; identifying entry and success criteria for technical reviews; identifying product and process measures to be used; identifying critical technical events; defining cross domain interoperability and collaboration needs; defining the data management approach; identifying the technical risks to be addressed in the planning effort; identifying tools and engineering methods to be employed; and defining the approach to acquire and maintain technical expertise needed. This also includes preparing the Systems Engineering Management Plan (SEMP) and other technical plans; obtaining stakeholder commitments to the technical plans; and issuing authorized technical work directives to implement the technical work** **SE 3.2** **Requirements Management** **Managing the product requirements, including providing bidirectional traceability, and managing changes to establish requirement baselines over the life cycle of the system products. This includes preparing or updating a strategy for requirements management; selecting an appropriate requirements management tool; training technical team members in established requirement management procedures; conducting expectation and requirements traceability audits; managing expectation and requirement changes; and communicating expectation and requirement change information** **SE 3.3** **Interface Management** **Establishing and using formal interface management to maintain internal and external interface definition and compliance among the end products and enabling products. This includes preparing interface management procedures, identifying interfaces, generating and maintaining interface documentation, managing changes to interfaces, disseminating interface information, and conducting interface control** **SE 3.4** **Technical Risk Management** **Examining on a continual basis the risks of technical deviations from the plans, and identifying potential technical problems before they occur. Planning, invoking, and performing risk-handling activities as needed across the life of the product or project to mitigate impacts on meeting technical objectives. This includes developing the**		

strategy for technical risk management, identifying technical risks, and conducting technical risk assessment; preparing for technical risk mitigation, monitoring the status of each technical risk, and implementing technical risk mitigation and contingency action plans when applicable thresholds have been triggered. (continued) 16 2.0 Fundamentals of Systems EngineeringNASA SYSTEMS ENGINEERING HANDBOOK Competency Area Competency Description SE 3.0 Technical Management SE 3.5 Configuration Management Identifying the configuration of the product at various points in time, systematically controlling changes to the configuration of the product, maintaining the integrity and traceability of product configuration, and preserving the records of the product configuration throughout its life cycle. This includes establishing configuration management strategies and policies, identifying baselines to be under configuration control, maintaining the status of configuration documentation, and conducting configuration audits SE 3.6 Technical Data Management Identifying and controlling product-related data throughout its life cycle; acquiring, accessing, and distributing data needed to develop, manage, operate, support, and retire system products; managing and disposing data as records; analyzing data use; obtaining technical data feedback for managing the contracted technical efforts; assessing the collection of appropriate technical data and information; maintaining the integrity and security of the technical data, effectively managing authoritative data that defines, describes, analyzes, and characterizes a product life cycle; and ensuring consistent, repeatable use of effective Product Data and Life-cycle Management processes, best practices, interoperability approaches, methodologies, and traceability. This includes establishing technical data management strategies and policies; maintaining revision, status, and history of stored technical data and associated metadata; providing approved, published technical data; providing technical data to authorized parties; and collecting and storing required technical data. SE 3.7 Technical Assessment Monitoring progress of the technical effort and providing status information for support of the system design, product realization, and technical management efforts. This includes developing technical assessment strategies and policies, assessing technical work productivity, assessing product quality, tracking and trending technical metrics, and conducting technical, peer, and life cycle reviews. SE 3.8 Technical		

Decision Analysis

Evaluating technical decision issues, identifying decision criteria, identifying alternatives, analyzing alternatives, and selecting alternatives. Performed throughout the system life cycle to formulate candidate decision alternatives, and evaluate their impacts on health and safety, technical, cost, and schedule performance. This includes establishing guidelines for determining which technical issues are subject to formal analysis processes; defining the criteria for evaluating alternative solutions; identifying alternative solutions to address decision issues; selecting evaluation methods; selecting recommended solutions; and reporting the results and findings with recommendations, impacts, and corrective actions

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6.0 Crosscutting Technical ManagementNASA SYSTEMS ENGINEERING HANDBOOK

performance characteristics and for initiating detailed design for a CI. The allocated baseline is usually controlled by the design organization until all design requirements have been verified. The allocated baseline is typically established at the successful completion of the PDR. Prior to CDR, NASA normally reviews design output for conformance to design requirements through incremental deliveries of engineering data. NASA control of the allocated baseline occurs through review of the engineering deliveries as data items.

- **Product Baseline: The product baseline is the approved technical documentation that describes**

Level 1 Technical Requirements
FUNCTIONAL BASELINE
Configuration Information Non-Configuration Information (examples)
Milestones
Major Architecture Aspects of Design Complete
ALLOCATED BASELINE
Implementation Aspects of Design Complete
PRODUCT BASELINE
Realization Aspects of Design Complete; Fabrication and Text Complete
MDR
Concept
Partial analyses and studies
Program and project plans
Developmental data

Complete
analyses
Developmental
data
Test plans
System Spec
Test information
Manuals
Certifications
Product
structure
SDR
SRR
PDR
ORR
SAR
CDR
Segment Spec
Prime Item
Design-to-Spec
End Item
Design-to-Spec
End Item
Build-to-Spec
End Item
Design-to-Spec
End Item
Design-to-Spec
Segment Spec Segment Spec
Prime Item
Design-to-Spec
Prime Item
Design-to-Spec
FIGURE 6.5-3 Evolution of Technical Baseline
City power: vision mission municipality ;
The starting

Trade drawing but mission properly is municipality governance **Articles**

Title	**CEO Visits City Power Depots**
Tagline	**Your work environment is where you spent most of the time, only returning home to be with your loved ones at the end of the day. It is therefore critical that all employees keep their work environment clean, healthy and professional. Ntsokolo said.**
Summary	**Your work environment is where you spent most of the time, only returning home to be with your loved ones at the end of the day. It is therefore critical that all employees keep their work environment clean, healthy and professional. Ntsokolo said.**
ImageURL	

SchedulingStartDate	**5/3/2021 12:00 AM**
SchedulingEndDate	**7/31/2021 5:00 PM**
ArticleAuthor	**City Power News to Internal Employees**
ArticleType	**Featured News**

Content

A planned outage is a power interruption that occurs when City Power switches off electricity supply at a substation or other portion of the network in order to execute maintenance and /or emergency duties to correct defects in the network so that it functions at its maximum potential.

Loss of Power

A subsequent loss of power to customers as a result of a planned outage being implemented, may affect all or some of the areas/customers supplied from the substation or portion of the network concerned as in certain occasions only part of the substation may be isolated.

However it is important to note that the areas mentioned as affected in the scheduled planned outage notice document are the areas that will definitely be isolated (switched off).

For more information please see the scheduled planned outage notices attached

www.citypower.co.za
City Power Johannesburg
40 Heronmere Road
Reuven
Johannesburg
PO B Box 38766
Booysens
2016
Tel +27(0) 11 490 7000
Fax +27(0) 11 490 7590
Non-Executive Directors: L Bethlehem (Chairperson of the Board), H Chewane, D Gibson, D Hunt, N Kahlana-Mcubuse, M Mello, L Nage, M Seopela
Executive Directors: L Setshedi (Chief Executive Officer)
M Smith (Company Secretary) Registration number: 2000/030051/30 VAT number: 4710191182
14 February 2019
Time: 15h30
Media Alert
Alexandra planned outages cancelled due to load shedding
The Planned outages that were scheduled to affect Alexandra tonight and tomorrow night (14 and
15 Feb 2019) have been cancelled due to load shedding.
The planned power interruption was necessary to do essential maintenance work on our

network which is part of our program of constantly striving to provide better service.
It would be extremely harsh for City Power customers in Alexandra to experience load shedding
and planned outage in the same evening which would subject them to long hours of electricity loss.
Stage 2 load shedding that affects block 1B including parts of Alexandra will start at 20h00 this
evening and it is expected to return at 22h00.
City Power appeals to customers in Alexandra not to conflate the 20h00 load shedding and
cancelled planned outage as the same power outage.
City Power will inform people of Alexandra well in advance of the new date for a planned outage.
As the supply may be restored at anytime, customers are urged to treat their electricity
supply points as live at all times
For updated list of blocks and areas affected by load shedding please visit City Power
website on www.citypower.co.za
City Power will keep customers updated via twitter handle: @CityPowerJhb
……………………………….Ends…………………………………….
For media queries please contact
Isaac Mangena – City Power Spokesp
HomeCurrently selected
▯ **Customers**

- **Feedback**
- **Geyser Control**
- **Meter Reading Schedules**
- **Tariff Info**
- **Prepaid Vending**
- **Energy Tips**
- **Fault Logging**
- **Claim Forms**
- **Load Shedding**
- **Energy Usage**
- **Service Connection Application Process**

▯ **Tenders**

- **Available Tenders**
- **Supplier Registration**
- **Tender Notices**

▯ **City Power**

- **Leadership**
- **Company Profile**
- **Media Statements**
- **City Power Reports**
- **Community Partnership Programme**

▯ **Contact Us**

- **City Power Locations**
- **Maps to City Power**

Bid close tendered energy metering reading

Instrumentl control measure beater panel

Bid close

APPLICATION FORM FOR TRADE ASSISTANT
⎫ Kindly note that applications are only open to South African citizens;
⎫ The purpose of this form is to assist City Power in selecting suitable candidates;
⎫ This form must be submitted in full, accurately and legibly. All substantial information relevant
to a candidate must be provided in this form;
⎫ All information received will be treated with strict confidentiality and will not be used for any
other purpose than to assess the suitability of the applicant; and
⎫ Correspondence regarding the applications will be to the successful applicants only.
A. PERSONAL DETAILS
Surname
First Names
Age
ID Number
Race African Colored Indian White
Gender Female Male
Do you have a disability? Yes No
If yes, elaborate
Are you a South African citizen? Yes No
Do you have a criminal record? Yes No
If yes, elaborate
3
B. CONTACT DETAILS
Email address
Mobile Number
Physical Address
Which Metropolitan Municipality do you reside in?
C. QUALIFICATIONS
Kindly tick the box that represents your NQF level
NQF 3 - N2 / Grade 11
NQF 2 - N1 / Grade 10
NQF 1 - Grade 9 / ABET Level 4
HIGHEST GRADE PASSED
Name of School Province Highest Grade Passed Year Obtained
OTHER QUALIFICATIONS OBTAINED
Name of institution Name of Qualification Qualification Type (e.g. Certificate,etc.) Year Obtained
D. DECLARATION
I hereby declare that all the information provided in this application and any attachments in support
thereof is to the best of my knowledge true and*TRADE*: APPRENTICESHIP/TECHNICAL *TRAINING*. DATE ON WHICH APPRENTICESHIP WAS COMPLETED: PERIOD OF APPRENTICESHIP OR TECHNICAL *TRAINING*: FROM: REGISTRATION ...
4 pages

1 CITY POWER (SOC) LIMITED ARTISAN-IN-TRAINING APPLICATION ASSISTANT CHEF-IN-TRAINING The Artisan-in-Training programme is applicable to unemployed persons who wish to pursue a career as Artisans. Once the application is approved, the successful applicant will be required to submit documentation as requested. NB. Please attach a certified copy of your South African identity with this application. Application forms without a certified copy of your South African ID will not be considered. 1. PERSONAL PARTICULARS (mark the appropriate box with an X) Surname Full Names Race African Indian Highest Qualification Gender Male Disability Yes Date of birth Coloured White Institution Female No D D M M Y Y Y Y SA ID No. Residential Address Contact no. (work) Cell Email address 2. ARTISAN-IN-TRAINING PROGRAMME APPLIED FOR 1 Artisan-in-Training: Electrician 3 2 Assistant Chef-in-Training 4 3. REQUIREMENTS SECTION: ASSISTANT CHEF TRAINEE (Please answer the following honestly. Any information given by you will be subject to a stringent verification process) 3.1 Do you have a 1 year post-matric/N3 Culinary Certificate Yes No Give details: 3.2 Do you have at least 1 years kitchen/culinary experience Yes No Give details: 4. DECLARATION I declare that the information submitted above is accurate, true and honest Applicant's signature Date N.B. This application form does not serve as a job offer or an acceptance into the Artisan-in-Training programme. Should you not hear from us within 15 days of the closing date consider your application unsuccessful. Kindly return the completed form using this email address : recruitment.HRtm@citypower.co.za www.citypower.co.za City Power Johannesburg 40 Heronmere Road Reuven Johannesburg PO B Box 38766 Booysens 2016 Tel +27(0) 11 490 7000 Fax +27(0) 11 490 7590 Non-Executive Directors: L Bethlehem (Chairperson of the Board), H Chewane, D Gibson, D Hunt, N Mcubuse, M Mello, L Nage, M Seopela Executive Directors: L Setshedi (Chief Executive Officer), Q Green (Chief Financial Officer) M Smith (Company Secretary) Registration number: 2000/030051/30 VAT number: 4710191182 Engineering graduates in training 2018/2019 City Power Johannesburg (SOC) Limited as a progressive company committed to the skills and development initiatives of the country and striving for the social and economic development of the region, invites suitable candidates with excellent		

academic performance to apply for graduate in training programme who completed their Electrical Engineering Degrees in South African universities.

Requirements

 You must be an Electrical Engineering graduate from a South African University
 You must be a South African Citizen (women applicants will have an added advantage to address employment equity quotas of the company)
 Your CV (maximum two pages)
 Certified copy of academic transcript.
 Certified copy of Qualification/Completion letter
 Certified copy of Matric certificate
 Certified copy of South African Identity Document

Academic Streams Targeted

Applicants who have completed their Electrical Engineering degrees in one of the following field:

 Electrical Engineering (Heavy/Light Current)

To Apply

Kindly forward your Applications to recruitment.HR&T@citypower.co.za quoting “GIT 2018/2019”. In case of further information regarding this advertisement, please contact: The assigned HR &T personnel, Thandi Sithole 011 490 7545 or Grieta Phiri 011 490 7394.

NB: Faxed/post applications will not be considered. You can download the application form on the web address:

Application Form for Employment (Graduates Internship)_2019

 Closing Date : 25 January 2019

Note:

 City Power is an Employment Equity Employer; therefore,
the configuration of a CI during the pr

Submission:

- Legogo to revisit 119 accounts with no access
- 20 accounts have no meters, meters to be installed
- 5 business accounts with prepaid meters, verify the tariff on the system

Fourth Submission:

- Legogo to provide a date for visitation to the 119 properties with no access
- Legogo to assist delivery of the 20 letters to the customer addresses found with no meters
- Revenue recovered from the tariff changes is R16 million, projected R80 million

Other Income

Fees earned for the year are more than the budget by R4 million due to sundry revenue that is R4 million less than budget due to the decrease in insurance claim refunds.

Other income for the year is R61 million less than budget due to the following:

- Cut-off fees are less than the budget by R35 million due to fewer cut offs.
- DSM Levy is less than the budget by R12 million. Capital contribution (which is the DSM Levy) fluctuates as per the units sold. Therefore, the higher the units sold, the higher the capital contribution. Since the YTD actual units sold were less than the budgeted units, the actual capital contribution was also less than budgeted.
- Government Grants for the year are more than the budget by R5 million; additional claims for grants were claimed.
- Interest revenue for the year is more than the budget by R33 million. This is due to the increase in outstanding debtors as a result of the COVID-19 pandemic.

Expenditure

A negative variance of 0.48% against the budget was realised for the current period under review.

Bulk Purchases Eskom & Kelvin

Bulk purchases cost from Eskom is less than budget and mainly attributable to

the fact that the actual bulk units purchased were below budget. The Electricity supply from Eskom is displaced to the extent that Kelvin Power Station is able to supply electricity.

The overall electricity demand was lower than the budget.

The Kelvin Power Station, unfavourable variance of R221 million is attributable to the actual bulk purchase cost per unit being higher than the budget. The favourable volume variance helped reduce the overall YTD variance.

Employee-related costs - Basic salaries are less than the budget by R5 million.

Depreciation is R27 million less than the budget due to slow capitalization of assets and the underspending of the Capex budget.

Finance cost is R13 million more than budget because of the increase in loans from Shareholder

Debt impairment is R358 million more than budget because of the poor collection level.

Repairs & Maintenance is 26% below budget as a result of contracts not finalised.

Capital Expenditure Details

The expenditure at financial year end after taking into account accruals amounted to R684 million compared to the revised budget of R754 million which is R70 million below the target, this translates to 91% expenditure as at the 30th of June 2021.

Project Detail

Original Budget

(R’000)

YTD Actual

(R’000)

YTD Variance

(R’000)

Electrification 113,817,000 112,938,577 878,423

Service Connections 48,500,000 95,603,711 (47,103,711)

Upgrade of Electrical Network 167,200,000 203,045,939 (35,845,939)

Building Alteration/Construction 2,803,115 157,174 2,645,941

Computers 4,800,000 4,817,441 (17,441)

Office Equipment 100,000 193,561 (93,561)

Computer Software 22,246,885 - 22,246,885

Tools and Loose Gear 4,600,000 240,044 4,359,956

Telecommunication 20,000,000 19,984,418 15,582

Fire and Security 5,000,000 2,552,202 2,447,798

Meters 70,500,000 59,260,533 11,239,467

SCADA 10,000,000 - 10,000,000

Protection 10,000,000 - 10,000,000

Furniture 450,000 340,286 109,714

Public Lighting 60,000,000 57,223,901 2,776,100

Refurbish of Bulk Infrastructure 213,949,000 28,100,943 114,038,248

Insurance - 28,100,943 (28,100,943)

TOTAL 753,966,000 684,369,481 69,596,519

Table 89: Capital Expenditure

Table 90: Controllable Capex

Description

Actual

(R’000)

Budget

(R’000)

Variance

(R’000) % Variance

Previous Year

YTD (R’000)

Bulk Purchases 12,133,490 12,175,141 41,651 0% 11,523,086

Employee-Related

costs 1,296,688 1,354,944 58,256 4.3% 1,265,014

Administration 103,618 172,662 69,044 40% 104,017
Depreciation 586,937 560,093 (26,844) -5% 589,517
Finance costs 523,890 511,007 (12,883) -3% 574,478
Lease rentals 688,502 714,137 25,635 4% 689,973
Debt Impairment 792,538 434,830 (357,708) -82% 453,655
Repairs and
Maintenance 813,225 1,094,209 280,984 25.7% 978,385
General Expenses 1,406,978 722,356 (684,622) (94.8%) 578,757
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Controllable Capex

The expenditure at financial year end after taking into account accruals amounted to R561 million compared to the year-end target of R705 million which is R145 million below the budget, the underspending is mainly attributed to delays in the execution of projects under bulk infrastructure as well as other Capex & Asset purchases due to lockdown regulations.

Table 91: Non-Controllable Capex

Electrical Infrastructure

Electrical infrastructure comprises Upgrade of Electrical Networks, Meters, SCADA and Load management projects. The expenditure at financial year end after taking into account accruals amounted to R285 million against the budget of R273 million which is R12 million above the target. The overspending was as a result of fast-tracking of upgrades of electrical network and emergencies which came into effect due to winter season which caused an overloading on the grid.

Power Systems

Power Systems comprises the Protection project. The expenditure at financial year end after taking into account accruals amounted to zero compared to the year-end budget of R10 million. It should be noted that the amount not spent has been reallocated to emergency capital where urgent repairs were effected due to vandalism on infrastructure.

Bulk Infrastructure

The Bulk Infrastructure projects are a catalyst for economic growth and a key driver for property development, be it residential, business or commercial. The completion of these projects provides additional capacity that can supply new or increased customer demand for electricity. Furthermore, these projects improve the reliability and availability of supply by reducing outages that stemmed from ageing infrastructure at the substations level. The improved connectivity of the high voltage networks improves the main transmission corridors. These allow for electricity to be transferred from one corridor to another which minimises large scale and prolonged power outages.

The investments in Bulk Infrastructure projects contribute to our network’s modernisation, in line with City Power’s vision of creating a smart grid for a smart city of the future. This infrastructure allows for remote control and monitoring of our substations and this minimises outage duration as diagnoses can be performed more speedily and restoration of supply expedited more efficiently. Most importantly, the new infrastructure provides improved safety for personnel; the new switchgear uses gas insulation instead of oil. There are therefore no risks of fire and explosion on this type of equipment. In addition, operating of equipment is performed in the substation control room or by the main System Control at City Power head office; these will go a long way in reducing work-related injuries and fatalities that are related to operating of old and potentially dangerous equipment.

The expenditure at financial year end after taking into account accruals amounted to R100 million compared to the year-end budget of R214 million which is R114 million below the target. The under expenditure was mainly attributed to the reduction in the number of employees (contractors) working on projects due to lockdown regulations (COVID-19), this had an effect on the work planned on all bulk projects.

Electrification

Electrification of informal settlements is aligned to the sustainable human settlements priority. Access to electricity has a substantial positive impact on the quality of life of the recipient communities such as those mentioned above. The programme is meant to improve revenue collection; reduce electrical and non-electrical losses, carbon footprint, and security of electricity supply, reduce illegal connections in and around informal settlements.

The expenditure at financial year end after taking into account accruals amounted to R112.9 million compared to the budget of R113.8 million, which is 99.2% expenditure.

Public Lights

The street lighting is also aligned to the sustainable human settlement priority and provides a number of important benefits such as promoting security in urban areas and increasing the quality of life by artificially extending the hours in which it is light so that activity can take place. Street lighting also improves safety and security for drivers, riders, and pedestrians. There has been positive feedback from members of communities with regard to the difference the provision of streetlights have made in their lives within their neighbourhoods. For this reason, there is an increase in demand from other communities in the form of petitions.

LED lighting projects have also been executed in the Northern and Southern areas, and they have been proven to reduce energy consumption, resulting in energy savings. One of the LED streetlight benefits is that it typically requires less maintenance and lasts longer.

The expenditure at financial year end after taking into account accruals amounted to R57 million compared to the budget of R60 million, which is a 95% expenditure. This reflects an under expenditure of R3 million, this was as a result of COVID-19.

Non-Controllable Capex

The non-controllable capital projects are projects which are funded by public contributions and through insurance funding. The expenditure at year end amounted to R124 million against the year-end budget of R49 million, which is R75 million above the target.

Table 92: Historical Financial Performance

Controllable Project Detail (by Project)	Original Budget (R’000)	YTD Actual (R’000)	YTD Variance (R’000)
Electrification	133,817,000	112,938,577	878,423
Public Lighting	60,000,000	57,223,901	2,776,100
Electrical Infrastructure	272,700,000	284,843,092	(12,143,092)
Power Systems	10,000,000	-	10,000,000
Other Capex and Asset Purchases	35,000,000	5,748,506	29,251,494
Refurbish of Bulk Infrastructure	213,949,000	99,910,752	114,038,248
TOTAL	705,466,000	560,664,827	144,801,173

Non-Controllable Project Detail (by Project)

Adjusted
Budget
(R’000)
YTD Actual
(R’000)
YTD Variance
(R’000)
Service Connections 48,500,000 95,603,711 (47,103,711)
Insurance - 28,100,943 (28,1002,943)
TOTAL 48,500,000 123,704,654 (75,204,654)
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Service Connections
The Service Connections projects are funded by public contributions. The expenditure at financial year end after taking into
account accruals amounted to R96 million compared to the year-end budget of R49 million which is R47 million above the target.
The overspending was a result of a higher number of service connections applications received than anticipated.
Insurance
This category of projects is funded by insurance as a result of insurable events. The expenditure at financial year end after taking
into account accruals amounted to amounted to R28 million from the insurance claims received during the financial period.
5.3. Historical Financial Performance
The table below is taking stock of the company performance from an operational perspective for the past five financial years,
including the performance for the current year ended 30 June 2021.
Table 93: Gross Margin and Losses Analysis
This information is drawn from financial information as reported to external parties (Audited). It should however be noted that the
financial year ended 30 June 2021 is the only year not subjected to an audit.
Actual
Restated
2017
(R’000)
Actual
Restated
2018
(R’000)
Actual
Restated
2019
(R’000)
Actual
Restated
2020
(R’000)
Actual
Restated
2021
(R’000)
Income
Service charge revenue 13,099,192 12,717,091 13,157,970 14,424,857 14,839,937
ESKOM revenue 746,264 - - - -
Prepaid 890,624 986,203 1,125,881 1,355,543 1,442,100
Total Service charges 14,736,080 13,703,294 14,283,851 15,780,400 16,282,037
Eskom 9,548,026 9,082,906 9,189,410 10,597,870 10,977,022
Kelvin 1,040,824 1,214,684 1,529,229 914,552 1,146,544
Kelvin Lease 471,220 513,873 571,502 634,489 626,487
Total Bulk Purchases 11,060,070 10,811,463 11,290,141 12,146,911 12,750,053

Gross Margin 3,676,010 2,891,831 2,993,710 3,633,489 3,531,984 Other Income 622,341 732,670 847,253 828,468 695,632 Other income 169,257 215,521 185,989 167,049 204,181 Capital grant 275,288 319,101 217,305 264,298 76,389 Interest revenue - debtors 55,555 68,275 63,532 35,978 58,288 Capital contribution 140,908 124,496 368,604 354,580 337,620 Rental income 251 474 556 602 616 Interest revenue - sweeping account 21,082 4,803 11,266 5,961 18,537 Total Income 4,338,351 3,624,501 3,840,963 4,461,957 4,227,616 Other Expenses Employee-Related Cost 972,921 1,087,605 1,121,564 1,265,014 1,296,688 Other Expenditure (Incl Tax) 2,235,172 2,101,821 2,030,916 2,219,693 2,096,604 General expenses (Incl Tax) 100,912 233,875 86,308 200,014 89,463 Contracted services 656,683 464,389 222,511 188,716 237,136 Repairs & maintenance 812,177 722,587 895,593 978,385 876,393 Internal charges(ME's) 164,924 193,563 258,763 263,060 306,674 Depreciation & amortisation		